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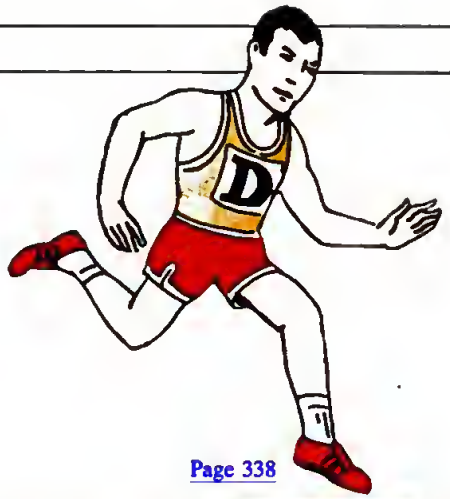

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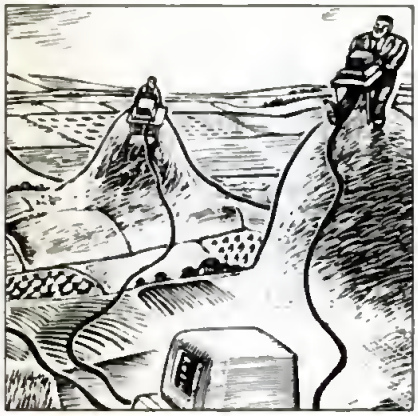

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CIRCLE 169 ON READER SERVICE CARD

Good things come in 2s. The DMP-40-2 is a good example.

TWO PENS, poised and able, help you create vivid multicolor business graphics quickly and simply, or let you plot and draw different line widths for critical drafting applications.

TWO FORMAT SIZES give you the freedom to generate vibrant graphics for reports and presentations. The standard 8½ × 11″ format is ideal for use in the report body, while the larger size is suitable for foldouts and photo reductions. Both the standard and larger 11× 17″ formats are available in bond, vellum and acetate film (for colorful overlays or overhead transparencies). The two formats are interchangeable with drafting sizes A and B. No extra-cost accessories are needed when plotting on different surfaces.

TWO INTELLIGENCE LEVELS provide the flexibility to plot in either a 'smart'or incremental mode. With internal firmware that occupies 16-thousand bytes, the DMP-40-2 borders on brilliance. It's capable of automatically generating such complex figures as circles, arcs, ellipses and general curves with a single simple command.

More software is tailored to the Houston Instrument DMP-40 Series than for any other plotter. Well over a hundred programs are available, offered by scores of capable vendors. Each program has been configured in concert with Houston Instrument, so there are no rude surprises when you hit 'return.' Versatile programs for business graphics, investment analysis and computer-aided drafting are all available, with more added virtually on a daily basis.

Choose 2 for the show, and treat yourself to superior multi-color graphics at a very 'budget friendly*' price.

For the name, address and phone number of your nearest distributor or dealer, write Houston Instrument, 8500 Cameron Rd., Austin, Texas 78753. Phone 512-835-0900 or 800-531-5205 if outside Texas. In Europe contact Bausch & Lomb Belgium NV., Rochesterlaan 6, 8240 Gistel, Belgium. Tel. 059-27-74-45, tlx 846-81399.

houston instrument

*Suggested US Retail $995.
Meets FCC class B requirements. UL Listed. 4P011

CIRCLE 308 ON READER SERVICE CARD

No one else is using this simple method to teach you Lotus 1-2-3.

You didn't learn to swim by reading about it. You took the plunge. With a little extra support at first, 'til you could stay afloat on your own.

ATI's training software teaches you Lotus 1-2-3 in the same way.

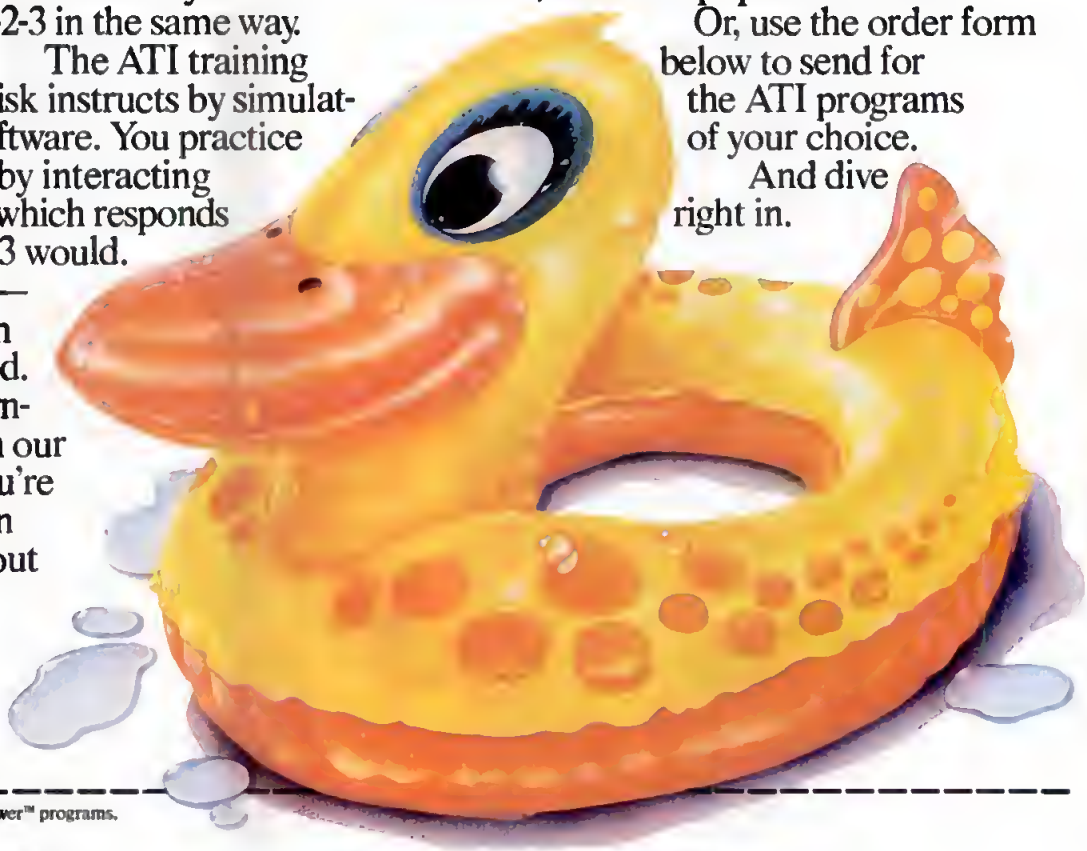
The ATI training disk instructs by simulating the actual software. You practice each command by interacting with the screen, which responds just as Lotus 1-2-3 would.

It's faster—and easier—than any other method. Once you've learned the skills with our helping hand you're ready to swim on your own. Without sinking.

The ATI Training Power package for Lotus 1-2-3, with disk and handbook, is available at your computer dealer. Along with our line of training programs, based on the same simulation method, for other popular software.

Or, use the order form below to send for the ATI programs of your choice.

And dive right in.



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Integrated Software
☐ Lotus 1-2-3

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☐ dBASE II-vol. 1 & 2
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☐ WordStar-vol. 1 & 2
☐ EasyWriter II
☐ Perfect Writer
☐ Spellbinder
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Financial Planning
☐ Multiplan
☐ SuperCalc
☐ VisiCalc ($50 Limited Offer)
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☐ PC DOS
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Programming
☐ BASIC
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☐ BPI Gen. Acct.
☐ Peachtree General Ledger*
☐ Peachtree Accounts Receivable*
☐ Peachtree Accounts Payable*

*PC(MS) DOS formats only.

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CIRCLE 116 ON READER SERVICE CARD

Textra™ word processing

The shortest distance between your thoughts and the printed word.

Your thoughts come faster than your words. Capturing them smoothly and quickly is the strength of Textra, and the secret behind its success.

Textra blends advanced features with a simplified design that makes it easier to write with your personal computer. And that's what word processing is all about.

Start with the 'on-line' tutorial, which has been called everything from elegant to excellent. It's the finest introduction to a software program ever filmed. You'll be ready to write in record time.

And Textra will be ready for you. Its highly responsive full screen editor helps you put your thoughts on the screen swiftly. Automatic reformatting and on-screen bolding and underlining show you what your printed text will look like at all times. You can even preview your pages *before* they're printed, so you only have to print them once!

Whether you're searching for your first word processor, or feel miserable with the one you have now, take a close look at Textra. Ask your dealer for a demonstration today.

It's guaranteed to open your eye.

Ann Arbor Software

407 N. Main, Ann Arbor, MI 48104 Phone (313) 769-9088

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CIRCLE 117 ON READER SERVICE CARD

What's Inside

In addition to its new look and its twice-a-month frequency, PC brings you a host of new information, columns, departments, and features.

Welcome to the new, improved *PC Magazine*. We have taken great pains to make this issue the best in *PC*'s history. You will find new sections, new columns, a new appearance, and a new outlook to go with our new 26-times-a-year frequency.

Even our cover subject in this issue concerns something brand new—the PC family of personal computers, ranging from little PC*jr* for the home to the remarkably powerful XT 370 mainframe workstation. Contributing editor Peter Norton, whose expertise on PCs has become legendary, has been involved in developing software for the new PC*jr*, and in this issue he gives us his detailed views of PC*jr* sights, sounds, and performance characteristics. He also gets personal, providing his views of where the IBM home machine fits in the computer universe. Also, games expert and writer Phil Wiswell looks at the PC*jr*'s impact on the computer game business, which, it turns out, will be significant.

New Senior Members

As important as the PC*jr* is for home use, the new XT/370 and 3270-PC members of the IBM computer family are equally important for offices, labs, and factories. These high-end extensions of the PC concept link IBM personal computing with the worlds computer telecommunications system and with mainframes. Charles Daney, a telecommunications and 370 systems expert from California, gives a technical overview of the new PC add-ons. *PC* editor Bill Machrone and executive editor Connie Winkler put the high-level micros in their business perspective.

Photograph: Dennis Bettencourt

This issue, our first of the ominous year 1984, also includes a series of articles examining the effect of computers on our society today. Have computers helped make life like that projected in Orwell's *1984*? We offer views from civil liberties lawyer Dorothy Samuels, and Jay Bloombecker, director of the National Center for Computer Crime Data. Our world may be both more and less like the world of 1984 than we thought.

Some New Regulars

Apart from the features, other exciting things are afoot in this issue of *PC*, including our new professional columns, guest editorial, a "PC News" section, and changes in the content and look of the magazine. Our guest editorial will open the pages of PC to opinions from the best known figures, the keenest minds, the most outspoken voices in IBM personal computing today. The growth of microcomputers and the increasing dominance of IBM in the micro marketplace has raised important issues that we think readers will want to see addressed by experts of all sorts.

Finally, this month we offer "PC News," an expanded section that includes our long-running "PC-Communiqués" pages. "PC News" is a late-closing, hot-item report, a place for us to handle previews, follow-ups and a bit of the absurd. This magazine-within-a-magazine will have a lively spirit and journalistic spunk all its own.

We hope you like our new magazine. We will be working to make it even better in the weeks ahead. Let us know what you think by writing us here at *PC*. ■

THE WORLD'S BEST SELLING MULTIFUNCTION BOARD IS NOW EVEN BETTER

The new 384K Quadboard by Quadram is the most comprehensive board you can buy for the IBM PC or XT. Now with added hardware features and advanced software. But our same low price.

NEW EXPANDED QUADBOARD
Quadboard now delivers 9 of the most needed PC functions/features. To let you get the most out of your Personal Computer. And help you work better and faster.

EXPANDABLE TO 384K

All of these features are standard on the new Quadboard:

- **Parallel Port:** With the new Quadboard, you get a Parallel Port. Perfect for operating most printers and other parallel devices.
- **Serial Port:** There's a Serial Port, too. Fully programmable, use it to connect to plotters, modems, and other serial devices.
- **Chronograph:** And Quadboard's Chronograph (Real-time clock/calendar) keeps your system's clock up-to-date.
- **Game Port:** The new Quadboard has an IBM compatible Game Port. Plug in a joystick or game paddles, and fire away.
- **I/O Bracket:** Quadboard now comes with a special I/O bracket. Use it to organize your expansion port connectors. Snaps right onto the back of the PC.

NEW

$295
Socketed with no RAM installed

QUADBOARD™

• **Expandable to 384K:** The new Quadboard is expandable in 64K increments for up to 384K additional RAM. With full parity checking standard. With the new Quadboard and a fully populated system board, you can take your PC's memory up to the 640K limit.

• **QuadRAM Drive:** Plus, with Quadboard you get advanced QuadMaster Software. Including the QuadRAM Drive program. Use it to set up multiple RAM Drives in Quadboard memory. Solid state drives that let you store and retrieve data quickly and easily. Or take advantage of QuadMaster disk caching. To access frequently used data whenever you need it.

• **MasterSpool:** QuadMaster Software also includes MasterSpool. Use it to set up a software print buffer quickly and easily. This advanced spooler lets you pause at any time, back up or move forward in a file. Choose just the amount of buffer space you need and stop waiting on your printer.

• **Qswap:** Another feature of QuadMaster Software is Qswap. With Qswap change line printers 1 and 2 back and forth, with just a few keystrokes, as often as you like.

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Now more than ever Quadboard is the first and only board your IBM PC or XT may ever need. No other board even comes close. Because Quadboard is designed for performance. Engineered for dependability.

And built in the continuing tradition of Quadram Quality.

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There are many imitators, but only one leader. So make sure you ask for Quadboard by Quadram, the leader in micro-computer enhancement products.

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Features/ Functions	Quadboard	SixPakPlus
Memory Available	0-384K	0-384K
Parallel & Serial Port	Yes	Yes
Clock/ Calendar	Yes	Yes
I/O Bracket	Standard	Optional
Game Port	Standard	Optional
Diagnostic Testing	Yes	Yes
Advanced Spooler	Yes	No
Simple Menu Setup	Yes	No
Disk Cache	Yes	No
LIST PRICE WITH 384K*	$795	$970

*Manufacturer's suggested list price for board with all available features/functions as shown (options included)
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CIRCLE 327 ON READER SERVICE CARD

BY QUADRAM™

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Introducing COMPAQ PLUS, the first high-performance portable personal computer.

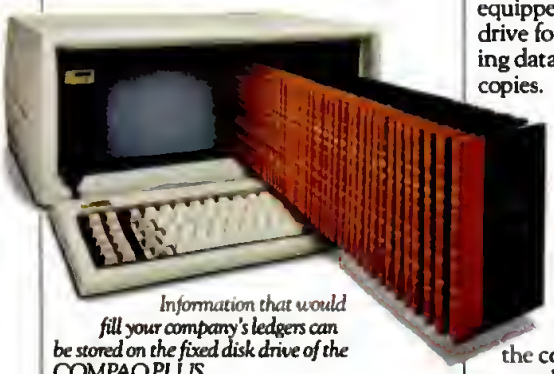
The makers of the COMPAQ™ Portable Computer, the industry standard, announce another breakthrough—the COMPAQ PLUS™ Portable Personal Computer. No other personal computer can handle so much information in so many places.

The new COMPAQ PLUS offers the power of an integrated ten-megabyte fixed disk drive in a portable. You get problem-solving power that no other personal computer can match.

Plus a bigger payload

How much is ten megabytes?

Enough to tackle jobs that can't be conveniently handled on most personal computers.



Information that would fill your company's ledgers can be stored on the fixed disk drive of the COMPAQ PLUS.

A mailing list of 100,000 names, addresses, cities, states, and Zip codes.

A full year of daily prices for every stock on the New York exchange.

Inventory records on a quarter million items.

The entire San Francisco phone book. And room left over for Peoria.

The fixed disk drive keeps all the information seconds away, ready to be searched, sorted, retrieved, analyzed or updated.

Plus better use of your time

The integrated fixed disk drive will store programs. That means your most used programs and data can be permanently kept in the COMPAQ PLUS, ready to call up and run.

With programs permanently stored, the COMPAQ PLUS becomes a well-informed traveling companion, a tool to help you apply your best thinking anytime, anywhere.

You could store a complete library of accounting programs on the disk—payables, receivables, general ledger, and payroll—*with* the company's books.

You could store an inventory control program with your inventory records and a list management program with your mailing list and a filing program with your personnel files.

The COMPAQ PLUS is also equipped with a 360K byte diskette drive for entering new programs, copying data files, and making backup copies.

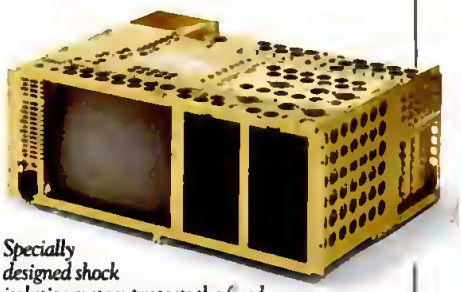
Plus more programs

More programs means more versatility. And the COMPAQ PLUS is impressively versatile because it runs all the popular programs written for the IBM® Personal Computer XT, available in computer stores all over the country. And they run as is, with no modification whatsoever.

And the high-capacity portable multiplies the productivity of every program it runs. Your inventory and its control programs can go with you to the factory. Your books and your accounting programs can go with you to a board meeting. Your building specs and your project management programs can go with you to the construction site.

You're buying a computer to solve problems. Why not have more problem-solving programs to choose from?

The COMPAQ PLUS runs all the popular programs written for the IBM Personal Computer XT.



Specially designed shock isolation system protects the fixed disk from jolts.

Plus a traveler's toughness

Life can be tough on the road. A true portable has got to be tougher. The COMPAQ PLUS is.

Its integrated fixed disk drive is unique, designed specifically to travel. Rough roads and hard landings don't bother it because of a specially designed shock isolation system that protects the disk from jolts and vibration.

All the working components are surrounded by a uniquely cross-membered aluminum frame. This structure, common in race car design technology, strengthens it side-to-side, front-to-back, and top-to-bottom.

The outer case is made of LEXAN®, the same high-impact polycarbonate plastic used to make bulletproof windows and faceplates for space suit helmets.

Does a portable personal computer really have to be this tough? Take a good look at your briefcase and then decide.

Plus ease of use

The COMPAQ PLUS is big where it counts.

The display screen is big. Nine inches diagonally. Big enough to show a full 25-line-by-80-character page that's easy to read even if you're leaning back in your chair.

The keyboard is full-sized and typewriter-style for easy control.

With its built-in display, the COMPAQ PLUS makes a smooth, low profile on your desk, not an obstacle that you have to talk around.

Plus an easy way to get started

If you're buying your first personal computer and you're not sure how much capacity you need, your choice is easier now.

Start with the COMPAQ Portable with single or double 320K byte diskette drives. If you need more capacity later, upgrade to the COMPAQ PLUS. A conversion kit is available that turns the COMPAQ Portable into a COMPAQ PLUS, complete in every detail and capability.

Plus a lot more

The COMPAQ PLUS also works with optional printers, plotters, and communications devices designed for IBM's personal computer family.

It has two IBM-compatible slots for adding optional expansion boards. With companion programs, they'll let you share information with a network of personal computers in your office, communicate with your headquarters computer files while you're away, or add memory capacity if your needs grow.

The COMPAQ Portable, the industry standard in portable personal computers. ▼

The problem-solving power of a high-performance desktop personal computer can now go where you need it.

It's got high-resolution graphics and text on the same screen. A detached keyboard. Programmable function keys. Expandable memory. Dozens of other features that simply make it do a better job of personal computing.

And when you see all that the COMPAQ PLUS has to offer, you'll be pleasantly surprised by the price. The fact is, it costs hundreds less than comparably equipped desktop personal computers.

See the first high-performance portable personal computer. The COMPAQ PLUS—performance, programs, productivity. Plus problem-solving power.

The new COMPAQ PLUS, the first high-performance portable personal computer. ▼

COMPAQ PLUS Specifications

Storage
- ☐ One integrated 10-megabyte fixed disk drive
- ☐ One 360K byte diskette drive.

Software
- ☐ Runs all the popular programs written for the IBM XT.

Memory
- ☐ 128K bytes RAM, expandable to 640K bytes

Display
- ☐ 9-inch diagonal monochrome screen
- ☐ 25 lines by 80 characters
- ☐ Upper- and lowercase high-resolution text characters
- ☐ High-resolution graphics

Interfaces
- ☐ Parallel printer interface
- ☐ RGB color monitor interface
- ☐ Composite video monitot interface
- ☐ RF modulator interface

Expansion board slots
- ☐ Two IBM-compatible slots

Physical specifications
- ☐ Totally self-contained and portable
- ☐ 20"W × 8½"H × 16"D

For the name of the Authorized Dealer nearest you, call 1-800-231-0900.

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No matter what level IBM Personal Computer training you want, our interactive tutorial software gives you the answers. Easier, faster, smarter.

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Both programs use vivid graphic images, creative animation, sound and living color to take you from mystery to mastery of your IBM PC. Each is totally self-paced. And they're "people-literate." So you really do learn.

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Requires MS-DOS, any IBM Personal Computer or Compaq Personal Computer with at least one diskette drive and a monochrome or color display.

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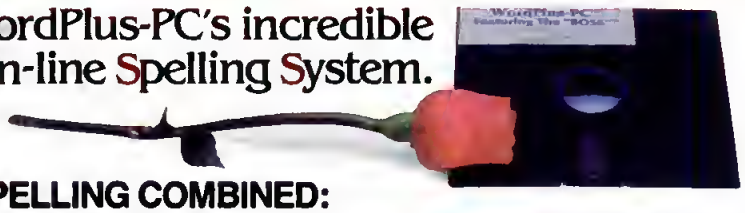
CIRCLE 529 ON READER SERVICE CARD

An Industry First in Word Processing Software:

WordPlus-PC™ featuring the BOSS™. Word processing so smart it can even spell 100,000* words.

Meet the BOSS. WordPlus-PC's incredible new Built-in On-line Spelling System.



WORD PROCESSING AND SPELLING COMBINED:

WordPlus-PC featuring the "BOSS" is a whole new technology in word processing software. Finally, the most powerful word processing capabilities have been combined with a built-in electronic spelling system which not only *checks your spelling* but also *corrects your spelling.*

The "BOSS", an acronym for Built-in On-line Spelling System, eliminates embarrassing spelling errors in your letters and stops time consuming trips to the dictionary.

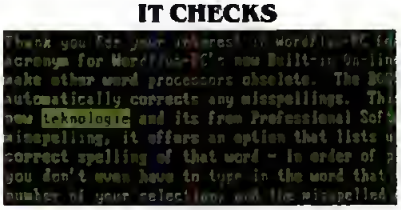
But WordPlus-PC featuring The "BOSS" will do far more than just check and correct your spelling. It's been designed to be exceptionally easy to use and yet contain all the powerful features you expect and more. Like built-in mail merge for personalized form letters, invoice generation and the ability to merge information created by most other popular programs such as 1-2-3™ and dBASE II.™ And if you have a question, just press the HELP key to get back on track.

You can also print bar graphs and other charts,** easily move columns, scroll horizontally, execute global search and replace, boilerplate text, and even print proportionally spaced on selected printers. And WordPlus-PC is compatible with virtually all popular letter-quality and dot matrix printers.

*With 90,000+ word standard dictionary and ability for a user to add over 10,000 "custom" words.

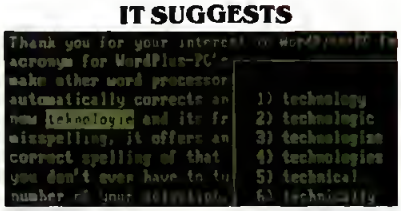
HERE'S HOW THE BOSS WORKS FOR YOU:

IT CHECKS



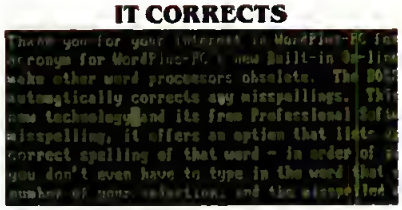
At the touch of a button, virtually anytime during typing or after the creation of a document, The "BOSS" locates and *highlights misspelled words* on your screen. The "BOSS" can even check the spelling of a word directly after it's been typed in.

IT SUGGESTS



When a word is misspelled, the user can ask The "BOSS" for suggestions as to how to correctly spell the word. With only one keystroke, The "BOSS" will display, in a dynamic on-screen window, up to eight *spelling suggestions in the order of probable phonetic correctness.*

IT CORRECTS



And The "BOSS" *Auto Correct* feature enables users to "fix" these misspelled words directly in text with a single keystroke. The "BOSS" is a total spelling system that Checks, Suggests, and Corrects your Spelling. All built-in.

THE TOTAL WORD PROCESSING SOLUTION — PLUS ALL THE HELP YOU'LL NEED.

With over 70,000 word processors in use worldwide, Professional Software, Inc. has designed WordPlus-PC to contain all the powerful features you expect — and to be the easiest word processor to use anywhere. But there will always be questions. That's why Professional Software has an entire bank of Nation-wide TOLL FREE customer HELP lines to support our registered users. This service is available at No Charge during the 90 days following the receipt of your registered users card.

Demand to see the BOSS in person
Visit your local professional computer dealer or call us toll free for the dealer nearest you. Once you witness the BOSS in action, you'll see that all other word processors have become totally obsolete.

Demand to see the "BOSS" today! Call us toll free, 1-800-343-4074.

Professional Software, Inc.

51 Fremont Street, Needham, MA 02194 Telephone (617) 444-5224 Telex 951579
Now Available for IBM-PC and Compatibles, DEC Rainbow, TI Professional, and Victor 9000.
Dealer, distributor, OEM manufacturer, and international inquiries are invited.

WordPlus-PC and The "BOSS" are trademarks of Professional Software, Inc.
1-2-3 is a trademark of Lotus Development Corp., dBASE II is a trademark of Ashton-Tate.
Specifications are subject to change without notice.

WordPlus-PC was designed and written by Andres Escallon.
**With IBM dot matrix and Diablo 630 ECS printer bar graphs and other charts can be printed inside text.

CIRCLE 374 ON READER SERVICE CARD

QuadDisk™ by Quadram™

Quadram™ presents QuadDisk.™ The new hard-disk system.

QuadDisk gives you maximum storage capacity in the limited space you've got. Turning your IBM™ Personal Computer, PC XT, Compaq,™ Chameleon,* or Eagle* computer into a micro powerhouse.

Choose from 6 to 72MB Fully Integral

QuadDisk comes in 6, 12, 20, 27, or 72 megabyte capacities. All integral to the computer for fast, convenient data access. And for added flexibility, there's QuadDisk with removable cartridges. For up to 6MB on-line storage plus added data security. (Not to mention virtually unlimited off-line storage.)

QuadDisk comes complete with disk controller board for total system integration.

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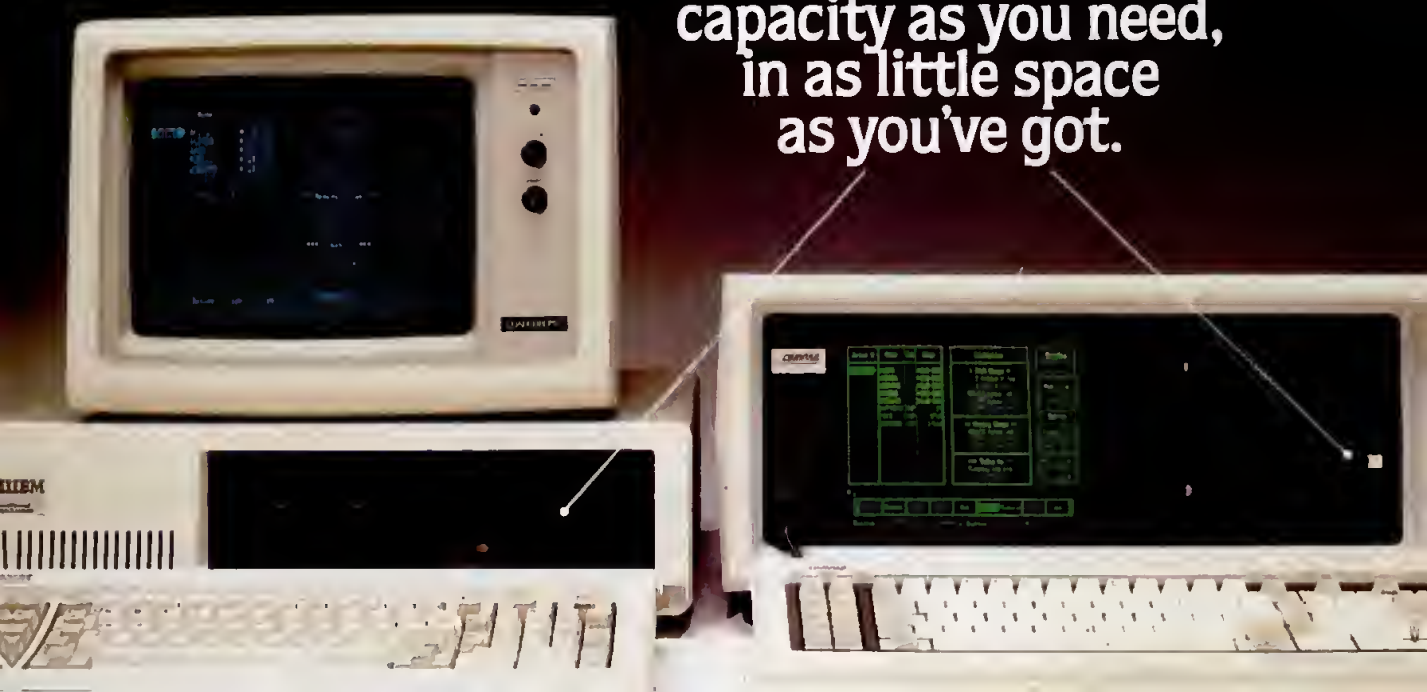

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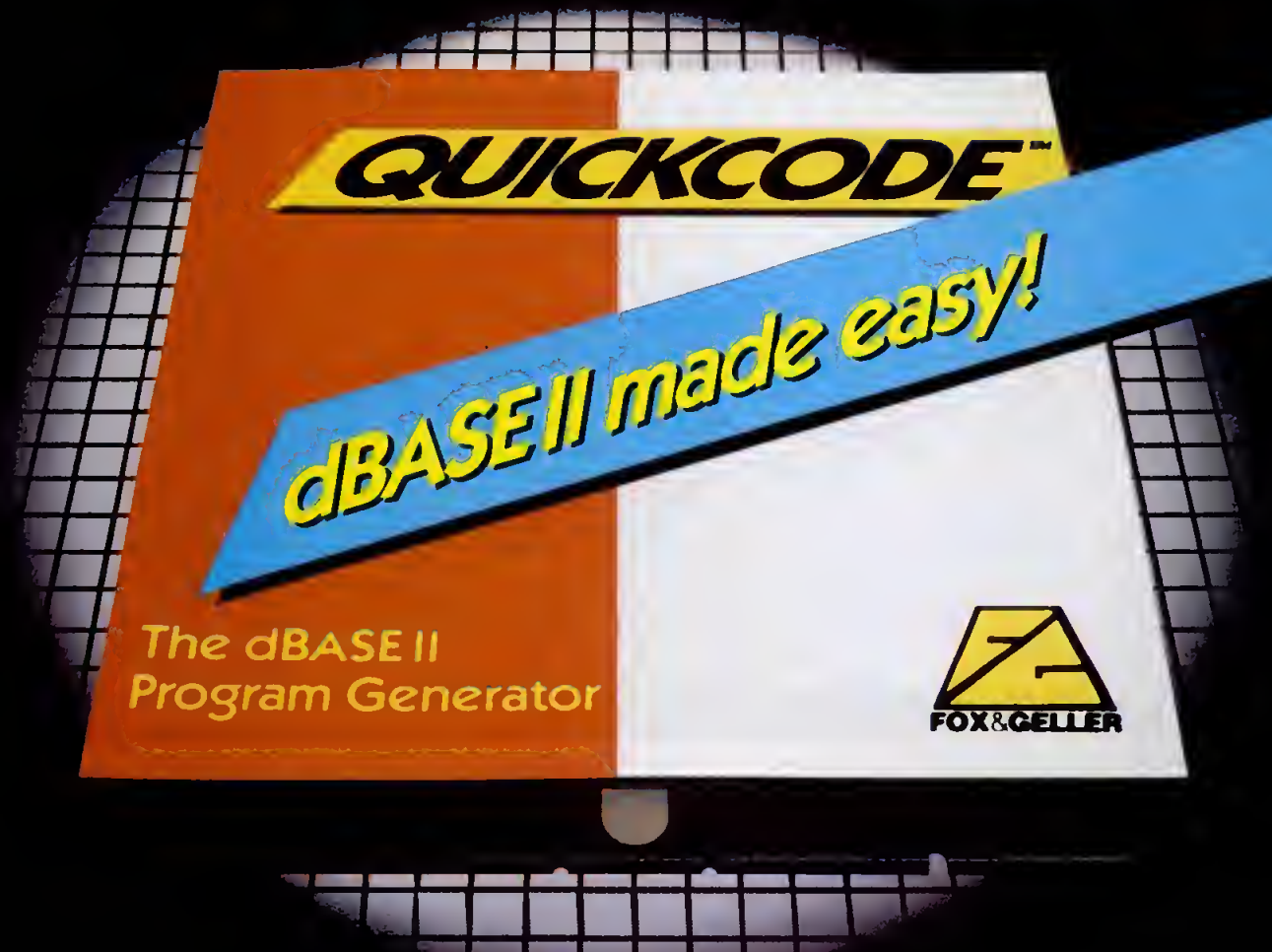

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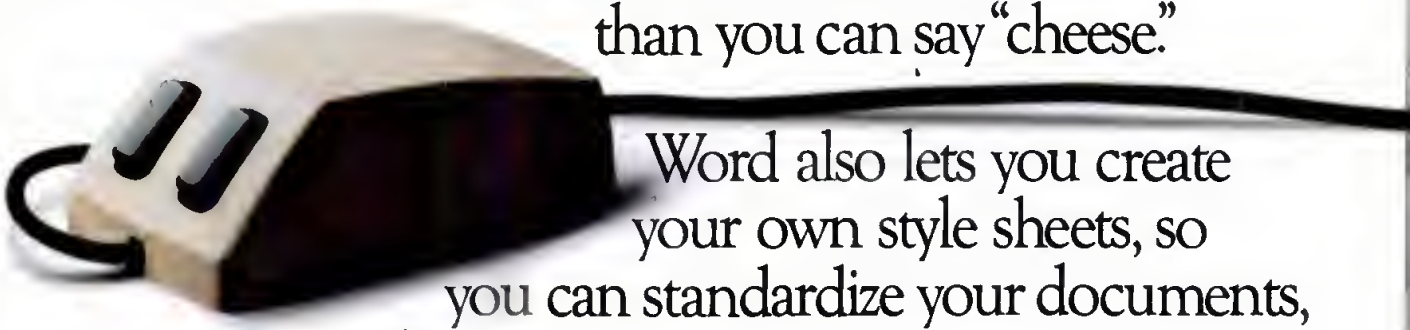

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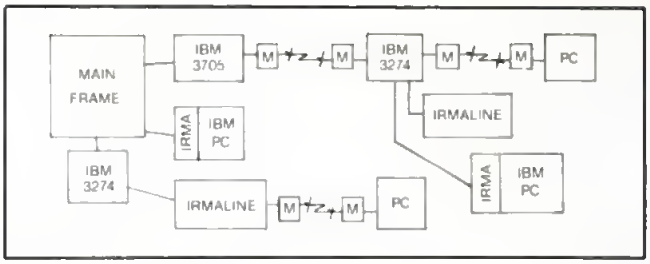

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Trends and Developments of IBM Personal Computers

IH News

FROM THE EDITORS OF PC JANUARY 1984

IBM IS TRUMPS IN BIG LAS VEGAS GAME

When high-rolling Comdex hits tinsel town, there's new meaning for slots and chips——and the Japanese join the fray.

CONNIE WINKLER AND MARTY PORTER

LAS VEGAS. Hardware and software manufacturers might as well have been playing at the game tables here at the Winter COMDEX '83 Show. Many old cards were in play, only a few new cards were showing—and the players, for the most part, were old hands.

New cards at COMDEX were dealt by:

- Japanese manufacturers showing 16-bit personal computers that, in one or more ways, aped the IBM PC.
- A surprising number of manufacturers that offered UNIX-based systems, including one which buttons together the MS-DOS and UNIX operating systems.
- Rana Systems, Inc., which put on display an odd box, with two 5¼-inch drives and three boards, that allows the Apple II to run MS-DOS programs, for $1,799.
- Tandy Corp. joined the PC-compatible fray announcing its TRS-80 Model 2000. The Model 2000 with an Intel 80186 microprocessor costs less than a PC and is thrice as fast, Tandy claimed.

The Commuter, a peculiar-sized, 16-pound, IBM-compatible, introduced by Visual Computer, Inc. at COMDEX.

There were many old cards—or slightly updated versions of old cards—which were dealt on the exhibit floor spanning two meandering pavillions and three hotel convention centers. These included:

- IBM's new PC*jr* home computer. Big Blue took over an entire "Gold Room" of the main hall and set up about 80 PCjr's for by-ticket-only demonstration of DOS 2.1 for both users and software designers. IBM also released some of the first technical details on PC*jr*.
- 1983 was the year of the portable computer, and the year ended with a bang. Portables were everywhere, including a new and peculiar-sized one, the Commuter, from Visual Computer, Inc., of Marlboro, Massachusetts. It's about the size of IBM's hard-disk drive attachment for the IBM PC, runs MS-DOS, weighs about 16 pounds, and costs $2,450 for a typical configuration.
- And, of course, there were more integrated software applications packages—many, if not all, with windows or windows capability.

Throughout the displays the IBM PC was a ubiquitous machine, with many, many software and peripheral vendors claiming their products ran on the PC.

The Japanese are also warmly embracing the MS-DOS and 16-bit playing card

as evidenced at COMDEX. Matsushita (under the label Panasonic), Fujitsu, and Sanyo had PC look alikes...and Sharp reported good sales of its new $1,995 portable lap computer.

In addition, another Japanese company, Mitsubishi, announced it has the OEM assembly contract for Sperry Corporation's entry into the IBM compatible horserace.

Of particular interest was the Matsushita-owned Panasonic Company's portable, the Senior Partner, a MS-DOS 2.0 computer the company claims was rated "highly compatible" by Future Computing, the Richardson, Texas consulting firm. However, it's the Senior Partner's price tag that's really expected to turn heads—the unit is priced at $2,495 with a single disk drive. Add $450 to the tab for a second drive and $320 for a 128K RAM expansion board.

The Senior Partner has a 16-bit 8088 microprocessor with an 8087 co-processor socket.

The philosophy behind Fujitsu's new product in the personal computer marketplace can best be described by this gambling town's term "hedging your bets." Three of the most popular micro operating systems were demonstrated on its Micro 16s Personal Business Computer—MS-DOS, CP/M-80, and CP/M-86—although the standard unit will be sold with CP/M-86 bundled in... for $4,000

Sanyo, meanwhile, billed its MBC 550 as 100 percent IBM PC compatible "except with graphics." Again, the price tag is a big selling point with the one disk drive version (160K) at $1,000—right under the nose of the $1,269 announced for the IBM PC*jr*. A larger version, with two disk drives, is expected to sell for $1,400.

Several UNIX multi-tasking systems were on the floor, but one from CYB Systems, Inc., of Austin, Texas, provided file-to-file transfer between UNIX and MS-DOS via its network server CYB/Unite 16i. Running the UNIX System V operating system, which has been pretty much standardized by Bell Laboratories. The $40,000 16i can be used as the central node in a network of up to 16 IBM PCs, PC/XTs, IBM compatibles, or existing CRTs.

Rana Systems, Chatsworth, Calif., which for two years has made add-on drives for Atari and Apple systems said its latest IBM PC-emulating version will be available at the end of February. The system has been embraced by Apple Computer, as a way Apple users can bridge to the proliferating MS-DOS programs.

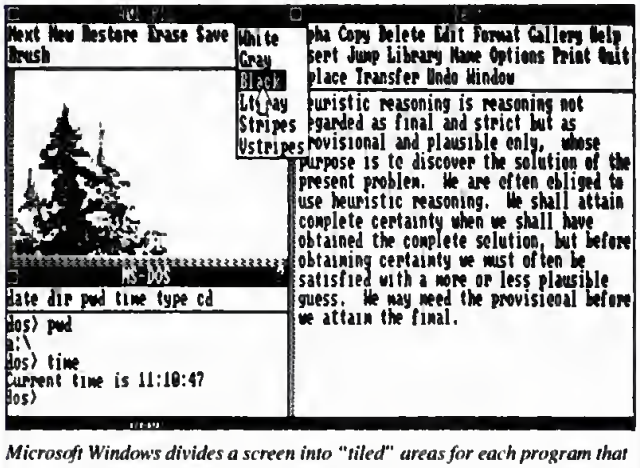
According to Rana vice-president, Donald Burtis, the Rana unit has two double-sided, double-density drives stacked on top of each other and three boards: one is for video and emulates the IBM color graphics board, the second has two Intel 8086 microprocessors, and the third is a memory board with 256K (which can be upgraded).

The Rana IBM mimicker also requires a single card to be installed in the Apple II. Rana runs with the latest Apple operating system, proDOS, CP/M-56, or CP/M-60. ■

MICROSOFT OPENS WINDOWS

BY JAMES LANGDELL

Microsoft announced its plans for Windows, an extension to the MS-DOS operating system that should be available by May 1984. Windows will provide a standardized interface for bit-mapped graphics and mouse control, and the capacity to transfer data from one program to another if both programs use any of Microsoft's predefined data types.



Microsoft Windows divides a screen into "tiled" areas for each program that is selected for display.

Microsoft made this announcement in November at a New York press conference. At the conference, Microsoft's speakers were flanked by 23 personal computer manufacturers that plan to offer versions of Microsoft Windows for their systems. IBM, however, was not involved in this public announcement. Microsoft explained that nothing could be said at this time about IBM's support of Windows because "our policy is not to make any announcement regarding our relationships with OEMs unless that OEM chooses to make an announcement." Microsoft will have prepared a version of Windows for PC-DOS by April 1983, but details concerning the release time and price of this product depend on IBM. Several other computer manufacturers were said to be planning to bundle Windows and MS-DOS with the hardware they sell.

Microsoft's MS-DOS has become a standard disk-operating system for 16-bit microcomputers, thanks to IBM's decision to offer it with the PC. However, since MS-DOS does not include a set of standardized graphics operations, programmers who want to do graphics run the risk of writing software that can run only on a single computer model.

Microsoft Windows will

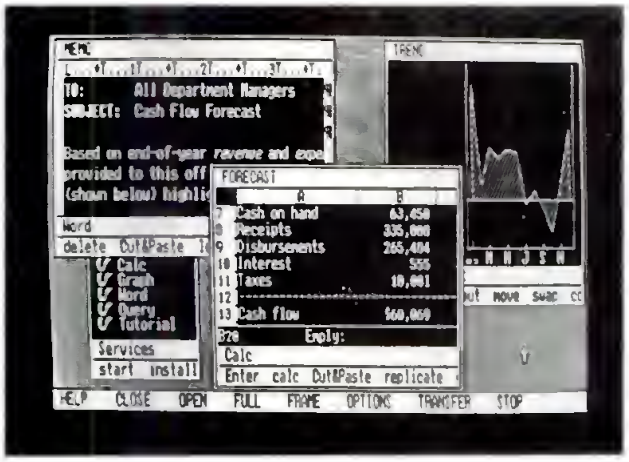
provide a hardware-independent set of fundamental graphics commands, so software written with these can be run on any model of computer that uses MS-DOS together with Windows. The minimum requirements are a system with MS-DOS (2.0 or a later version), 192K RAM, two disk drives (hard disk recommended), a bit-mapped display, and a mouse.

Programs available when Windows is running are listed at the bottom of the screen either by name or with an icon (that is, a diskette sleeve for a disk-operating system, a brush for a graphics application, a sheet of paper for a word processor). A program can be selected to appear in a window by using the mouse to move a cursor onto the icon or name. The commands for a program appear at the top of the program's window.

The windows are arranged in a "tiled" pattern in which the windows do not overlap. If the full contents of a program's screen can't fit in a smaller window, a user can use scrolling to display different portions in the window. A "zooming" feature can be used if you choose to have any one program fill the full screen (Microsoft admits that Windows' users would spend most of their time working with programs one at a time).

By the time Windows is released, Microsoft intends to have its *Word* and *Multiplan* programs available in versions that can take advantage of the new capabilities.

For more information on Windows, write to Microsoft Corp., 10700 Northrup Way, Bellevue, WA 98004. ■



VISI ON COMES INTO SIGHT

BY JAMES LANGDELL

The Visi On "integrated applications environment" is finally available, several months after its expected release in the summer of 1983 and nearly a year after the system was first announced by VisiCorp at last winter's Comdex show. (See "Visi On, A Mouse On The Digital Desktop" in *PC*, Volume 1, Number 9.)

VisiCorp is now selling these products from its Visi On line: the Visi On Applications Manager software ($495) in versions for personal computers made by six manufacturers (including IBM's PC, XT and 3270PC); the Visi On Mouse ($250); and three applications programs that run under the Visi On manager: *Visi On Calc* ($395), *Visi On Graph* ($250), and *Visi On Word* ($375). A fourth program, *Visi On Query*, is a relational database manager, which is expected to have a list price of $375 when it appears in early 1984. The total price of this software and mouse is $2,140. VisiCorp recommends that Visi On be used on a system with a hard Winchester disk, at least 384K of memory, and graphics support.

The heart of the Visi On system is its Applications Manager, a level of software that fills a gap between the applications programs and a computer's hardware and operating system. A version of this software must be written to suit a particular combination of hardware and operating system, such as an IBM XT running PC-DOS 2.0. The Applications Manager provides standardized means that applications programs use to provide graphics and operate together. These functions aren't standardized in most operating systems.

One of Visi On's features is its ability to display the operations of several programs simultaneously on a screen in overlapping windows. A user can select which programs are displayed and determine the size and location of each window.

Most of the Visi On Application Manager functions are performed through a two-button mouse rather than the keyboard. For example, a program can be activated by moving the mouse to position a cursor within the program's window, then pressing the select button on the mouse. A double border appears around that window and the window appears in the forefront of the screen. The contents of this window are not covered by other windows; the effect is as if the selected program were a document pulled out of a pile of papers on a desktop, then placed on top of the stack. The mouse's other button is used for scrolling through the contents of a window.

One big difference in Visi On since it was first announced, is that VisiCorp decided to offer its software environment as an open system. Instead of marketing software that could only be used with other programs written and sold by VisiCorp, the company has published all the standards needed to write programs that are compatible with Visi On. VisiCorp is selling the software tools that were used by its own programmers and will charge no royalty.

IBM has agreed to offer the Visi On product line at IBM Product Centers. For more information on Visi On and the application developer's toolkit, contact VisiCorp, 2895 Zanker Rd., San Jose, CA 95134. ■

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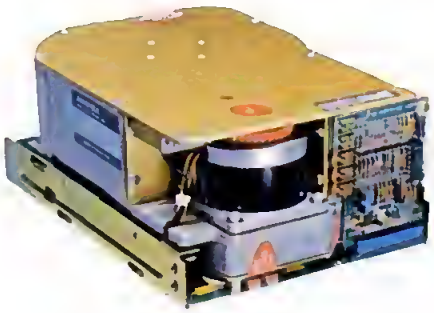
We recommend instead, that you buy the IBM *PC* for $2,104. You'll get one 320 Kbyte floppy disk drive, 5 slots, 64K of RAM, the same three IBM initials, a space for your dealer to put the Pegasus XT Conversion Kit, and an extra $2,891 to buy it with. But since the Pegasus XT Conversion Kit costs only $1,295 installed, you'll have an extra $1,596 — almost $1,600 — left over. With many compatibles you'll have even more.

But if you already own an IBM PC and were thinking you'd just get the XT expansion chassis, we have a surprise for you. If you add the $1,295 cost of the Pegasus XT Conversion Kit to the $2,104 price of an IBM PC, you can have a second computer — instead of a dumb box — for less than the price of the XT expansion chassis.

Hard Disk Quality

Now, before you start thinking that IBM's hard disk is better than ours, remember that IBM doesn't make their own hard disk for the IBM XT. They go into the marketplace, just like we do, and strike the best price they can. If you were to buy an IBM XT, your hard disk might come from one

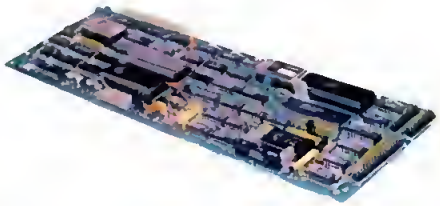


of four manufacturers. It's possible, in fact, that the IBM XT might have the same hard disk that you'd get in our Pegasus XT Conversion Kit.

The Role of the Controller

But the hard disk is not the whole story. It takes a controller card to get your files from the hard disk to your computer so you can use them.

The IBM XT has a good controller card. Unfortunately, it is not designed to take advantage of some of the advances in hard disk technology. Our controller card will work with our 10 megabyte hard disk all the way up to our 140 megabyte hard disk — and everything in between. With the IBM XT controller, you're limited to four manufacturers. The Pegasus controller board, on the other hand, configures to whatever hard disk you may want to install in the future. There is virtually no limit on hard disk size or number of manufacturers you can use.



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PC-COMPATIBLE PORTABLES

Portables are being upgraded with greater memory and durability as the competition among computer manufacturers heats up.

BY KAREN COOK AND JAMES LANGDELL

Several manufacturers of IBM compatible computers looking for new market niches are pinning their hopes on the same discovery: you can dress your PC or XT up, but you can't take it out. No matter how you look at your IBM, it's not portable.

At least three PC-Compatible portable computers have recently gone on sale, and more will follow. The first company to reach retail stores was Compaq, which introduced its Compaq Plus last October. Eagle Computer and Wilmington, Massachusetts-based Ivy Microcomputers started shipping new models shortly thereafter. Televideo Systems, Inc. and Seequa Computer Corporation, also makers of IBM-compatible machines, plan introductions soon.

President Rod Canion from Houston-based Compaq Computer Corporation quite literally unveiled the Compaq Plus: The first display model was draped with black fabric that Canion whisked off to reveal the new computer.

Looking proud, Canion declared that the Compaq Plus is the first non-IBM system to be fully compatible with DOS 2.0. If so, the company should maintain the reputation for compatibility it built with its highly regarded floppy disk portable.

The first few hundred new Compaq Plus units were already at dealers when Compaq made its announcement. Perhaps the slick presentation and smooth delivery was to reassure potential investors: that day Compaq had filed with the Securities and Exchange Commission (SEC) for its first public stock offering of six million shares. (At any rate, the concurrent-with-delivery announcement was a welcome change from the common industry practice of hinting at or advertising new products months before they are really available.)

The 31-pound Compaq Plus contains a 5¼-inch 320K diskette drive and a 3½-inch 10-megabyte hard disk. While Winchester drives have a history of fragility that seemingly makes them impractical for use in a transportable system, Compaq claims it solved this problem. Sturdiness was emphasized in its design so that the hard disk can withstand the abuse that a transportable computer must face.

The Compaq Winchester's smaller size made it possible to build in more protection around it. The disk is mounted into a rugged metal casing about the size of a 5¼-inch drive. Rubber bumpers protect the drive at top and bottom, and there's about an inch of clearance on either side of the drive. Compaq claims it ran destructive tests in which the hard disk and its data remained intact, even though the rest of the system was ruined. (Following the announcement, one Compaq staffer revealed that Canion had planned to demonstrate the machine's durability by "accidentally" knocking it off its stand so that it would crash—harmlessly—to the floor. Canion practiced this several times, and the computer survived, but the routine was ruled too awkward

PRODUCT INFORMATION

NAME	COMPAQ PLUS	EAGLE SPIRIT XL	IVY 3002	TELEVIDEO
Hard Disk Storage	10 mb 3½-inch mf: Rodime	10 mb Slimline mfs: Microscience Miniscribe	10 mb mf: Microscience	10 mb mf: Miniscribe
RAM (standard)	128K	128K	256K	128K
RAM (expanded)	640K	640K	512K	256K
Expansion Slots	two	four	none	one
Graphics Capability	PC color standard (320 x 200)	PC color standard (320 x 200)	mono (amber) (640 x 575)	PC color standard (320 x 200)
Serial Ports*	none standard	two	one	one
Weight (lbs.)	31	32½	22	30 (approx.)
Price	$4,995	$4,795	$3,995	NA

one parallel port is standard for all models

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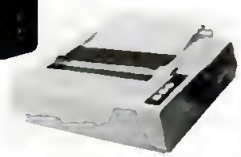
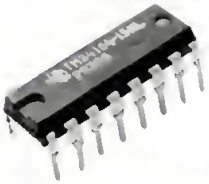
Lithium Powered Clock The RAM+3 clock/calendar eliminates the need to manually input the date and time each time you power up. And the inexpensive lithium battery ensures that the clock keeps accurate time even when the power is off.

RS-232 Serial Port It's an easy way to connect letter quality printers, modems and other peripherals to your IBM. It's compatible with IBM's Asynchronous Communications Adapter and can be selected as either COM1 or COM2. No translation software is required.



Parallel Printer Port Designed to operate most parallel printers, it is functionally identical to and completely compatible with the IBM Printer Adapter.

Memory Options To increase the memory capacity of your IBM, there are five RAM+3 memory options: 0k, 64k, 128k 192k, and 256k. The memory expansion boards are socketed and expandable in 64k increments to 256k. For users who do not need to increase the memory of their PC but want the clock and added port capabilities, a no memory, unsocketed RAM+3 is also available.



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for the press conference.)

Compaq's 3½-inch hard disk is formatted the same way as the 5¼-inch Winchesters used in IBM's XT. As a result, there isn't the loss of software compatibility that would be involved if a 5¼-inch diskette drive were replaced with a smaller model. These hard disks are manufactured by Rodime, of Scotland. Compaq is negotiating to have additional suppliers for its drives.

"To us, compatibility means to be able to run all PC and XT software off the shelf," Canion explained at the announcement. Canion believes that the Compaq Plus is the first system to be XT-compatible. The IBM XT has a personality of its own, Canion says, so it was a challenge to create a system that reproduced its effects without copying the machine exactly. Compaq's engineers even imitated some bugs in IBM's system so that XT software could find the same routes around problems on the Compaq Plus.

Like the original portable Compaq (see "Compaq: Have Computer Will Travel" in *PC*, Volume 2 Number 1), the Compaq Plus has a 9-inch diagonal, built-in monochrome monitor. The Compaq's monitor and graphics board allow it to use programs designed for both of IBM's display formats—character or color/graphics.

Compaq dealers are providing a $2,500 Fixed Disk Upgrade Option for the original portable Compaq, which is priced at $2,995 with a single 360K diskette drive. An upgraded Compaq is said to be identical to the new Compaq Plus, with no additional weight, so there's only a $500 price penalty for purchasing a standard Compaq before adding the hard disk. (Converting an IBM PC to function as an XT requires the addition of an expansion unit that is the same size as the system unit itself.)

The Ivy 3002: the main selling point is the Intel 80186 microprocessor.

Eagle's Spirit XL: a hard disk as tough as a floppy drive, the company says.

Asked how much Compaq is dependent on IBM having not produced a transportable computer of its own, Canion countered that Compaq is a quality machine competitive with IBM's. "Each has something to offer: IBM has its name and Compaq has its advantages."

Many customers who originally wanted an IBM PC bought a compatible machine instead because no IBM machines were in stock at the time. Did the shortage of IBM PCs and XTs this past year help provide Compaq with its initial success? Canion replied; "There's been a shortage of Compaqs too. I don't know if that's helped IBM or not."

* * *

Eagle Computer is another rising compatible manufacturer benefiting from IBM's shortfalls. Eagle beat Compaq to the stock market by going public last summer, but it trailed marginally in getting its new hard disk portable, the Spirit XL, into stores.

Eagle uses a standard 5¼-inch hard disk instead of a version of Compaq's 3½-inch model, but Vice President of Marketing William Roland insists Eagle's disk is just as durable. "It has a rating of 40-gravities, the same as a floppy disk, while Compaq's is only rated for 30-gravities." According to Roland, a 40-gravity rating means the disk can sustain a drop of three or four inches without damage.

At 32.5 pounds, the Spirit XL weighs a pound and a half more than Compaq Plus, but it costs about $20 less. Like the Compaq, the Eagle has 128K of RAM that can be expanded to 640K, a 9-inch screen, and built-in graphics capabilities. It comes with GWBASIC and CP/M-86. The Eagle has room for four expansion slots instead of Compaq's two. Also, Eagle's two serial ports are standard.

Another hard disk PC-compatible portable now available is the Ivy 3002, a companion to the Ivy floppy disk portable. The Ivy, which costs almost $1,000 less, is a stripped-down, 22-lb. version of Eagle and Compaq. Disks are formatted to 320K, and the 256K RAM can be expanded to 512K. The Ivy runs MS-DOS 2.0, but doesn't supply BASIC. There are no expansion slots.

Like the other manufacturers, Ivy promises durability. Company publicity quotes a mean time before failure of 10,000 hours. Ac-

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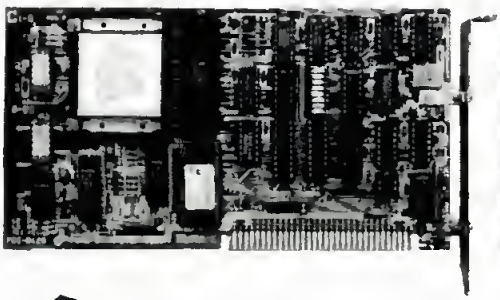

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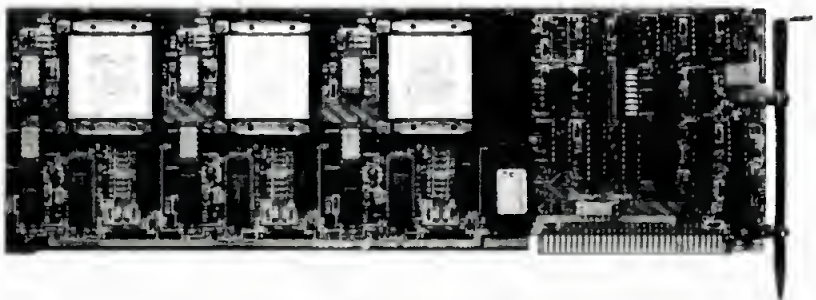

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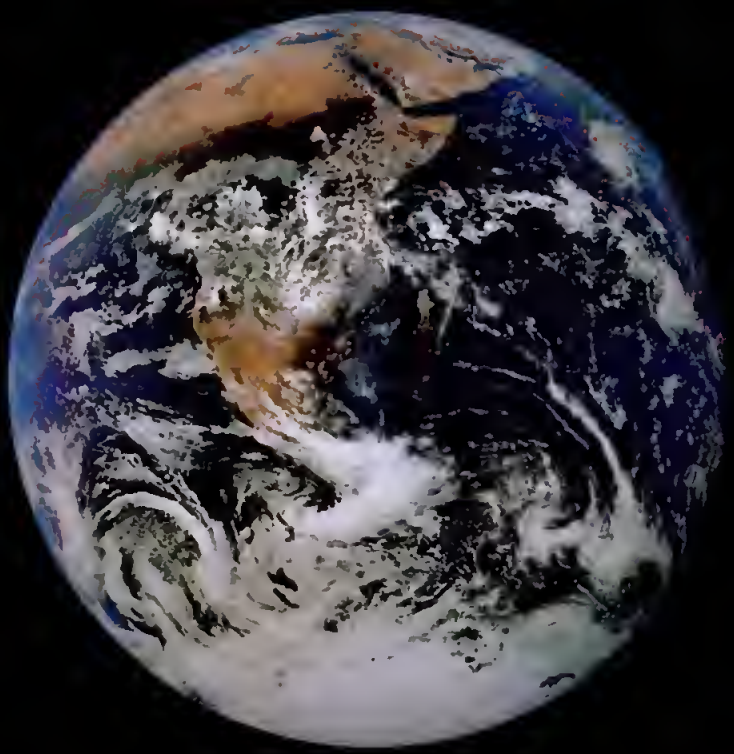

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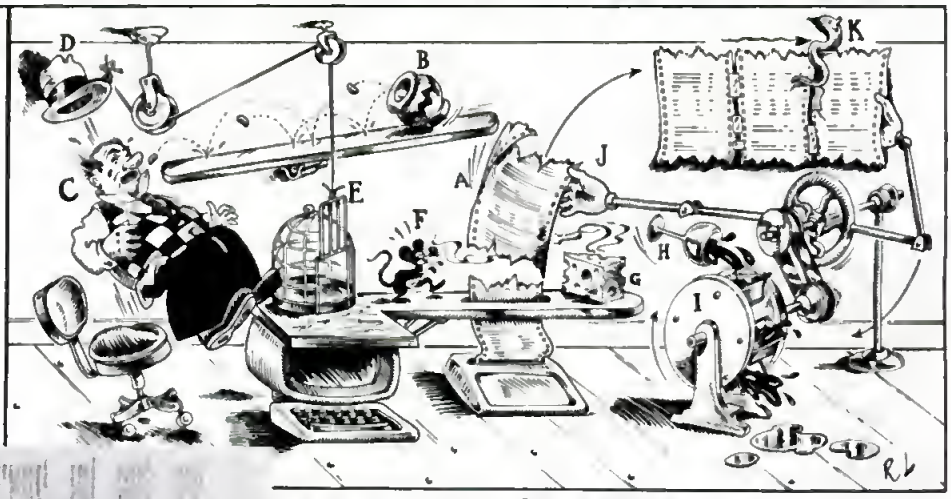
IN A FIT OF PIQUE HE SPILLS VINTAGE WINE (H) INTO WATER-WHEEL (I) WHICH TURNS PULLEY THAT CAUSES GLOVE (J) TO GRASP SPREADSHEET AND MOVE IT TO TAPING AREA.

SHEET IS TAPED SECURELY IN PLACE BY TRAINED ADHESIVE TAPE WORM (K).



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The experts agree. *PC* Magazine, for example, writes: "If you've got the need, Sideways has the solution." And *PC World* calls Sideways "nifty . . . . an easy to use program that does what it claims."

You can go Sideways today with an IBM® PC and an IBM,® Epson, Okidata, Prism,™ or Prowriter™ printer. Ask for Sideways at your local ComputerLand® or other leading computer stores. Or mail a $60 check to Funk Software, P.O. Box 1290, Cambridge, MA 02238. (617) 497-6339. MC/Visa accepted. Send no Mexican jumping beans, please.

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CIRCLE 306 ON READER SERVICE CARD

cording to the company spokesperson, Catherine Aronson, that figure was calculated by scientists at Harvard University. The pre-failure period works out to about 14 months—longer than any of the Ivy 3002s have been in existence.

Unlike the other machines, the Ivy 3002 uses an Intel 80186 chip. As a result, Aronson says, programs like Lotus *1-2-3* will run up to four times faster on the Ivy than on the PC.

Among the PC-compatible models to come: Televideo Systems of Sunnyvale, California plans a fixed-disk companion to the floppy disk portable announced at COMDEX in Las Vegas. The machine will have 128K of RAM, expandable to 256K, and run DOS 2.0 and BASIC. Televideo will use the 8088 microprocessor, and build in an empty slot for an 8087 coprocessor. The company hasn't packaged its hard disk yet, but Director of Marketing Gary Baughn says Compaq's 3½-inch disk housing "is an extremely good idea. That's the way we intend to go."

There is one cautionary note, and it comes from Seequa, the Odenton, Maryland-based company whose only product has been Chameleon, a floppy disk portable. Seequa premiered a computer with a detachable hard disk at COMDEX, but it is not a portable.

"We don't feel that you can get a hard disk failure rate down to an acceptable level. Basically, people are rushing the technology because they think it's a cute marketing concept," Marketing Director Jim Hoffman explains. Hoffman concedes that the 3½-inch model has possibilities, however, and guesses that Seequa may find suitable technology in six months or so.

As all these companies know, it's often a dangerous game for companies to stake their fortunes on filling a gap that IBM has left in the marketplace. There's a long history of manufacturers who vanished as soon as IBM moved into their price and performance niches. In the highly competitive world of PC-compatibles, getting Winchester disks ready to join the school of hard knocks is only half the battle. For Compaq, Eagle, Televideo, Ivy, and Seequa, the real war—in marketing—has yet to be won. ■

The Compaq Plus is built for durability. Its 3½-inch hard disk is fixed inside a metal casing, with cushioning rubber bumpers at top and bottom.

CARING FOR YOUR COMPUTER WITH A COMPUGIFT

No desktop computer need ever be lonely again.

Caring computer owners can surround their PCs with CompuCaddy, for pencils, CompuPlanter, or CompuBank. The sturdy plastic terminals are truly micro-sized—about 4" x 6" x 4". They feature a carefully modeled plastic keyboard inlay and a sliding, clear-screened "monitor" that will hold a family photograph. All CompuProducts are beige—the manufacturer found that PC-incompatible colors like pink and yellow did not sell well.

The mini-terminals are $9.99 plus a $2 shipping charge from CompuGift, Inc., 27802 Perales St., Mission Viejo, CA 92692. (714) 768-8223.

THIRTEEN GOING ...PROFESSIONAL

Microsoft's youngest beta tester found his job by finding a bug.

BY ELIZABETH BIBB

Thirteen-year-old Bob Freeman had his first contact with the Microsoft Corporation as a disgruntled consumer, not as a job applicant.

But after he called the company to complain about some bugs he had found in their *Flight Simulator* he was running on his IBM PC, he landed a job as a part-time beta tester for the Bellevue, Washington software developer.

The Microsoft receptionist who took his call mistook his voice for that of the son of product support specialist Delores Bergstrom, who's in charge of handling inquiries about the simulator, and put the call through.

Bergstrom said she answered the telephone with a "hello, little one," assuming it was her 11-year-old, but instead encountered an extremely flustered young computer enthusiast.

When both recovered from their embarrassment at the identity mix-up, Bob told Bergstrom that he had found some problems with the game and thought Microsoft should know about them.

Bergstrom told him that the company was aware of them and that a revised version of the simulator was about to be released. But she was so impressed by the teenager's eagerness that she asked him to test the new product.

Bergstrom spoke to Bob's parents and asked them to co-sign an agreement that Bob wouldn't divulge any information about the new product being tested. Bob's career was launched. *(continued)*

WE TURN YOUR IBM P.C. INTO A SMART TERMINAL.

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MULTIMATE WORD PROCESSOR

Some people have dreams while others have visions.

MULTIMATE: THE WORD PROCESSOR YOU'VE BEEN DREAMING OF

At SoftWord, we had a vision of what word processing on a personal computer ought to be.

We were challenged by a blue chip insurance company to create word processing for the IBM† PC that would mimic the features and functions of a dedicated system. Other software manufacturers thought we were dreaming.

We envisioned a word processing system that would make full use of the PC and its keyboard. With MultiMate‡, you get over 80 powerful word processing functions. Merge, a library for boilerplate, automatic underlining on the screen, on-line help, everything dedicated word processing could give you and more.

In our wildest dreams, we never imagined we would write the documentation reviewers say is the best in the industry. Or offer free enhancements for 180 days, including a spell checker/corrector with an 89,000 word dictionary.

Or that we would be called the "industry heavyweight."

By adding quality technical support, toll-free to end users and offering a 30-day money back guarantee, we took the nightmare out of word processing. In case you think it's still a dream, try MultiMate at a computer store near you.

SOFTWORD SYSTEMS, INC. (203) 522 2116 52 Oakland Ave., North East Hartford CT 06108

†IBM is a registered trademark of International Business Machines Corp. ‡MultiMate is a trademark of SoftWord Systems, Inc.

CIRCLE 477 ON READER SERVICE CARD

He has since tested other games and some hardware for the company, which is only about ten minutes from his house in Bellevue.

Using his connections with Microsoft as what Bergstrom calls "a foot in the door," Bob approached other local software and hardware outlets about doing beta testing. His enterprise landed him jobs with InfoCom and Sears Business Systems Centers.

Barbara Brubaker, a spokeswoman for Microsoft, said that while it's not unusual to find young people in the computer business—"The average age here is between 21 and 23 years"—Bob is the youngest employee of the company that she's aware of.

"He's not your typical 13-year-old," Bergstrom said. "He's very professional."

Although Bob isn't paid for beta testing, in accordance with Microsoft's policy, he does receive the games he tests once they're available commercially, and he is eligible to purchase any hardware at wholesale prices.

"Right now that's worth more to me than money," he said.

Bob's introduction to computers came just two years ago, on a TRS-80, when he was in the sixth grade at Chinook Junior High School in Bellevue. He said "everybody was trying to figure out how to tell everybody how to work the machine." He grabbed a manual and taught himself.

Within a year his parents had bought an IBM PC for their businesses. His father is an ophthalmologist and his mother is an accountant. Bob struck a deal with the elder Freemans for time on the computer in return for teaching his parents how to use it.

Bob drives a hard bargain, and is always on the lookout for ways to cash in on his computer expertise. He's already bagged a Boy Scout merit badge for computers. "That was easy. All I had to know was what a byte and a bit was."

His beta testing work is only done on weekends or during the summer, so as not to interfere with his homework. He said he uses the PC for school reports, especially in humanities class, in which his teacher "is very logical" he said, and into computers."

Bob also leads seminars on games for the Sears computer stores, critiquing them from a kid's point of view, and he's now writing a column in the Sears newsletter.

Bergstrom said that not even her own 11-year old is as excited by computers as Bob. "My son's into games. So it's nice to see a kid going beyond that," she said.

"We'll just have to see if he has that extra bit of talent, as well as the eagerness to go on," Bergstrom said.

Although he's not sure at this point in his career if he wants to make computers a lifelong pursuit—he's also considering Harvard Medical School—Bob has gone way beyond game-playing.

He's written a program incorporating saxophone music (he's in the school band) with one for reverse circles.

He is currently working on a game program he hopes to market, but he's stuck on the "PEEKs and the POKEs," he said.

"I can't get the computer to remember when the X's have been hit by the O's," he said.

Despite his frustrations with his first foray into product development, Bob's enthusiasm hasn't flagged.

Bob still says, "I like computers. They don't say anything bad to you. They just say, 'okay.' " ■

THE BAD OLD GOOD OLD DAYS ARE HERE AGAIN

Until PCs came along to make the computer business so very user friendly, we came to expect that most product announcements would be packed with blocks of text as congested as the following sample, brought to our attention by Shawn S. Patrick of Springfield, Illinois. It describes one of the highlights of a piece of software:

"All dyadic-defined functions are ambivalent, allowing them to be used monadically without generating a syntax error. The system function □NC can be applied to the left argument within a function to determine, at execution time, whether the function actually has been called as a dyadic or monadic."

So, what's this—an account of the inner workings of IBM's advanced 308X series of processors?

No, it's from a recent IBM "Programming Announcement" of "APL for the IBM Personal Computer."

The grand tradition continues.

SOFTWARE, DISKS, AND LITTLE BROWN JUGS

IBM started a mail and phone order operation called IBM Direct, which provides its catalog on a diskette that describes over 160 products, many of which are not available at IBM Product Centers. Screens of product lists and descriptions appear in monochrome or color.

There's a 5 percent discount for prepaid orders over $50 and a 10 percent discount for prepaid orders over $100.

A listing of "Quad Density Diskettes" may be a sign of things to come from IBM. These are used in drives that can handle 96 tracks per inch, which haven't yet been offered by IBM for its personal computers.

On a color display, the multihued text is clear and attractive, but the musical rendition of "Little Brown Jug" at the beginning of the catalog is an inexplicably unprofessional touch.

To obtain an order form for the IBM Direct catalog diskette, write to IBM, P.O. Box 3148, Wallingford, CT 06494, or call (800) 631-5582.

Best's Professional Finance Program– Financial Aspirin for Tax Time Headaches.

It's hard to find the time to keep track of personal or small business finances, or to get the training needed to produce sophisticated financial reports. The result is often a makeshift accounting system that can cause a lot of headaches every April 15. But now Best Program's Professional Finance Program (PFP II) makes it easy for you to have all of the complex accounting tools you need right at your fingertips.

PFP II is a powerful record-keeping system that helps you organize 26 asset accounts like checkbooks, IRA's and money markets, as well as 26 liability accounts like credit cards, loans, and mortgages. The system also sets up over 1,000 income and expense categories, 99 sort categories for taxes and expenses, an electronic address book, and automatic check printing and reconciliation. In short, PFP II keeps track of all of your key financial records.

However, the Professional Finance Program is more than just a record-keeping system. From your input it provides eight basic types of financial reports. You can modify these to produce dozens of custom-tailored reports on things like income and expense summaries, budgets, and net worth. PFP II also tracks all asset and liability account activities and provides bar graphs for cash flow, income, and expense reports. Best's Professional Finance Program makes accounting a lot easier, allowing you time to *manage* your finances instead of *organizing* them.

And don't worry if you don't have any computer or accounting skills. The user's manual includes a tutorial that guides you through the use of the program in six easy lessons.

PFP II runs on the IBM Personal Computer (and the model XT) with a minimum of 128KB memory, and two diskette drives, one of which must be double sided.

PFP II is fully integrated with PC/TaxCut™, a tax planning and preparation program. Simply take the information provided by Best's Professional Finance Program and feed it into PC/TaxCut for an automatic printout of various tax forms. PC/TaxCut and PFP II provide you with a complete tax and financial package that can save you the worry often associated with financial and tax management.

You can order your PFP II for $245 and PC/TaxCut for $255 by using Visa, Master Charge or American Express. To order call toll-free, **1-800-368-2405**. In Virginia call 703-931-1300. Or write to Best Programs, 5134 Leesburg Pike, Alexandria, VA 22302.

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Brilliant!

Here's another brilliant idea from the makers of the popular MicroAngelo® graphics board—the SCION PC 640.

Whether you're a systems developer or an end-user, this solidly-designed color graphics board is your best choice for high-resolution color graphics on the IBM PC, as well as many PC-compatibles.

Here's why:

- 640 × 480 × 16 out of 4096 colors
- Memory-mapped for very high speed operation
- Over 60 2-D drawing primitives, accessible from Basic, Fortran, C, Pascal or Assembler
- High-level software packages available for painting, business graphics, CAD and slide production

The PC640 Professional Color™ board delivers superior resolution at 640 × 480, and the simultaneous use of 16 out of 4096 colors.

For more information on why the PC 640 may be a brilliant idea for you, please contact Jim Mather at (703) 476-6100, TWX: 710-833-0684, or write: SCION Corporation, 12310 Pinecrest Road, Reston, Virginia 22091.

SCION

CIRCLE 459 ON READER SERVICE CARD

DUNSPLUS PUTS XT IN FRIENDLIER PACKAGE

Customers are now offered one-stop shopping for information services.

BY JAMES LANGDELL

Dun & Bradstreet hopes that corporations will give a high rating to its new DunsPlus service, which is built around the IBM XT. As a value-added dealer of IBM's products, the financial services firm offers a system that combines hardware, software, and services, which is ready to use with ease for many applications. The price of a single, all-in-one DunsPlus system is $10,200; quantity discounts will parallel IBM's discount schedule for the XT.

The hardware component of DunsPlus is primarily an IBM XT with additional RAM (a total of 256K) and a built-in 300/1200 baud modem on a card provided by IBM. (This modem is not yet available other than as part of the DunsPlus system). An IBM color monitor and an IBM (Epson) dot-matrix printer come with the system.

On the XT's hard disk, 2.5 megabytes of software are provided, which includes the Lotus *1-2-3* spreadsheet/graphics program, the *MultiMate* word processor, and communications software. All the DunsPlus software is protected by a software lock that prevents the programs from being modified or copied, the Wilton, Conn. based company said recently.

The system runs on PC-DOS 2.0, but DunsPlus provides menus that are easy to understand without prior knowledge of the operating system's commands. Messages in the upper right corner of the screen, such as MENU, FORM, and WAIT, prompt the user on what to do at any stage. The menu selections can be made through any method a user might think of—the spacebar, cursor keys, and tab key all work as might be expected. The initial letter of a menu selection can also be entered to move the cursor onto that selection, so, once a user is familiar with the system, he can use these initial letters as commands to move quickly through the menus. DunsPlus' method seems a good compromise that combines the clarity of menu operation with the speed of command operation.

Extensive customer service is part of the DunsPlus package. An IBM service representative will come to the user's office to install the system and for subsequent repairs. Each user is provided with 2 days of hands-on training in a course developed by National Training Systems. Later, questions can be answered by calling DunsPlus' customer service center. DunsPlus will handle software support directly, including servicing software created by other manufacturers, such as *1-2-3*, that is packaged with DunsPlus. To make it easier to answer questions about software over the telephone, messages appear on the lower right corner of the screen that will enable a service representative to know exactly where the user is in a program. This total service support is provided for a year after purchasing a DunsPlus system and can be contracted on an annual basis.

By offering support for all parts of the system, DunsPlus claims to neutralize the fingerpointing that hardware and software vendors sometimes resort to when service is needed. ("It's a hardware problem," says the software vendor. "No, it's a software problem," says the hardware vendor.)

DunsPlus assembled its system by going to outside sources for hardware, software, and services, each of which has proven successful in the marketplace. But Dun & Bradstreet didn't just put together a "personal computing's greatest hits" package. The company contributed a great deal through the integration of elements in the system. Data can be transfered easily from one DunsPlus application to another. After receiving material through a communications network, a portion of the text can be transfered to the word processor for editing. This data can then be included in a memo, which is then ready to be transmitted as electronic mail, with no further formatting.

The system can be set up to access any teleinforma-

WHAT A DIFFERENCE A MILLIONTH CAN MAKE

We've already noticed that the floating-point arithmetic used by the PC's BASIC gives some peculiar results. Jack Kelly of Glendale, Missouri pointed out yet another oddity.

When Kelly used the INT command to round off calculations to the nearest whole integer, he got the correct result of 18 in response to:

```
PRINT INT (18.2-0.2)
```

However, when he used this mathematically equivalent command, which included another operation,

```
PRINT INT(2.6*7-0.2)
```

the IBM's BASIC came up with 17—an incorrect result.

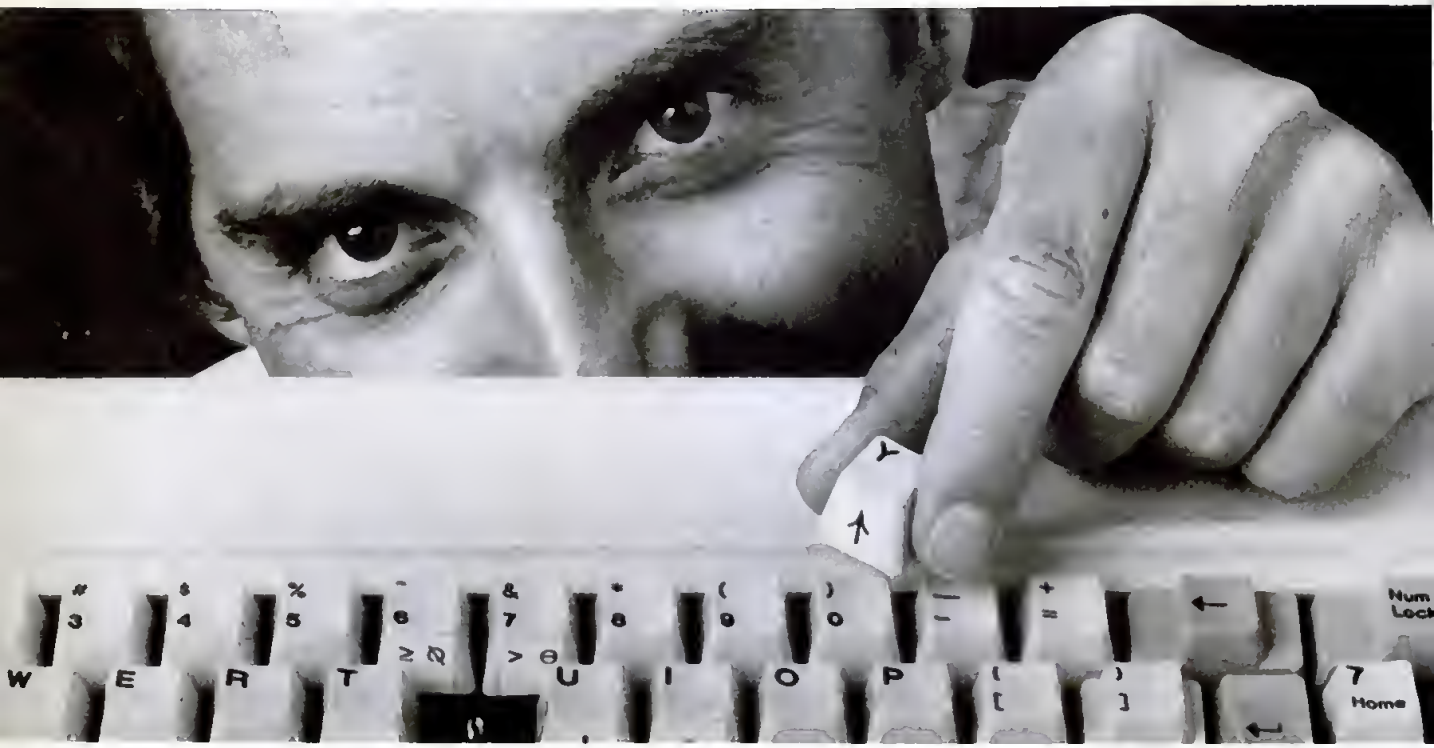
We tried this and got the same odd result. We also discovered that this glitch was very fine tuned. The correct result of 18 appeared when we substituted 0.199999 for .2. However, when we ran:

```
PRINT INT(2.6*7-0.1999999)
```

the seventh decimal place activated the bug and gave us the incorrect result of 17.

Sometimes floating point numbers just kind of float away from you. Has anyone found a way to get BASIC arithmetic to come down to earth?

PULL. PULL. STICK. STICK. CHANGE PERFORMANCE THAT QUICK.



What you see here is a remarkable system that will change the personality of your IBM Personal Computer. A system that makes it possible for you to use your PC to develop applications that normally require the resources of a much bigger computer. A system that quite literally transforms your computer from personal to professional. Here's how:

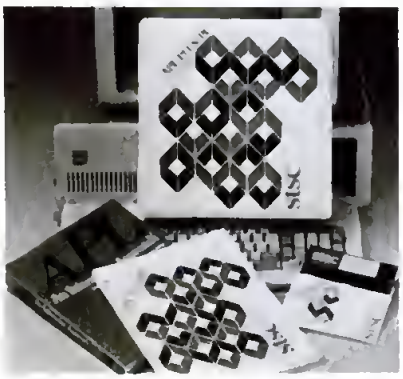
Easy As A,B,C

First you apply the character labels to your keyboard, then you plug in the custom ROM that will enable your PC to display these new characters. Third, you insert the disk and load the software to complete the change: APL*PLUS®/PC System from STSC.

Now, instead of limiting yourself to off-the-shelf spreadsheets, word processors, or slow program development in BASIC, you can develop custom solutions to problems that previously were beyond the scope of your PC.

The APL*PLUS/PC System is a complete APL language processor from STSC, the leading supplier of APL products and services for more than 14 years. It also includes STSC's business report formatting feature, communications capabilities, and data management features.

The APL*PLUS/PC System can interface to non-APL programs and data files so you can integrate your other software packages with the APL*PLUS/PC. And APL programs developed on your PC will run on other desktop computers, minis, and mainframes that support APL. Software developers may license the APL*PLUS/PC System to develop APL applications for resale using a run-time version of the system.



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The APL*PLUS/PC System requires an IBM PC or IBM PC XT with PC DOS at least 192K RAM memory, and one floppy disk drive. To order APL for your PC, call or write STSC, Inc., 2115 East Jefferson Street, Rockville, Maryland 20852, (301) 984-5123.
*U.S.A. price only.

CIRCLE 431 ON READER SERVICE CARD

tion services. Users may also install additional hardware or other MS-DOS based applications programs. These optional devices, programs, and phone services can be included as choices on the DunsPlus menus.

The DunsPlus system also can be connected to a company's own mainframe computers. DunsPlus provides binary synchronous IBM 3270 emulation, emulation of System Network Architecture (SNA) for the 3270 and 3770, and asynchronous terminal emulation.

Dun and Bradstreet intends to market DunsPlus as a complete system. There are no plans to sell the software and services to users who already own an IBM XT, or to offer systems built around other makes of personal computer. Robert Weissman, executive vice president of Dun & Bradstreet, said that DunsPlus couldn't provide the same high level of service if its customers had too wide a range of hardware. "If you want to have the DunsPlus, I'm sure someone in your office would love to have your present XT."

While Dun & Bradstreet hope that DunsPlus owners will use the system to access its information services, the company expects its new venture will pay its own way.

Several customers already have DunsPlus in beta test. It will be available commercially in February. For more information, contact DunsPlus, 187 Danbury Rd., Wilton, CT 06897, (203) 762-2511, or call DunsPlus branch offices in Chicago, Los Angeles, New York, San Francisco, and Stamford, Connecticut. ■

THE EMPEROR'S NEW DEBUGGER

Frustrated with your hardware? Software? Manuals? Coworkers? State of Mind? Life in general? A new product, Flooby Dust, is ready to dissolve any sort of digital dilemma by applying a secret ingredient—humor.

When you reach for the Bufferin-lookalike box and bottle, you'll have in your hands a lifetime supply of Maximum Strength Flooby Dust, a computer cure-all in the grand tradition of Lydia Pinkham and snake oil—but without the sticky mess. The eight-page manual says you can sprinkle or pour the Flooby Dust over a troubled diskette, keyboard, or programmer's head, and trust that all will be well once its magical properties take effect.

Flooby Dust is available for $2.95 from computer dealers or from its source, Wallace Micro-Mart Inc., 2619 N. University St., Peoria, IL 61604. This retailer focuses on Apple-related products, but its Flooby Dust is compatible with the IBM PC—as it is with anything else, for that matter.

Wallace Micro-Mart is holding a contest, through March 31, 1984, to find the best short descriptions of "My Favorite Flooby Dust Use." Wallace also produces Flooby Dust T-Shirts, Flooby Flappers, and Flooby Disks, all intended to dissipate any excess of gravity that may surround a computer.

COBOL'S DEBUT

On the Sunday afternoon of August 7, viewers of KSTS in San Jose, California witnessed a television first. "Window on Computers" presented a COBOL program's source code, statement-by-statement, as it executed. When we heard about this broadcast, we said, "They might call that entertainment in Silicon Valley, but it won't play in Peoria without a lot more pizzaz!"

When we investigated this story, we found it was more interesting — PC-wise — than we expected. The broadcast was made possible by a PC-compatible software tool called *cobol animator,* the creation of Micro Focus Inc. *COBOL Animator* can be used to display COBOL source code as the program executes, at any speed of execution and with pauses at any point. Programmers can use it as a tool for walking step-by-step through a program to debug it or to understand how an existing program works.

COBOL Animator is available for $800 in a version that works with the $1,600 Level II COBOL, which is marketed as part of Digital Research's CP/M Library. The software tool is also provided as part of Micro Focus' new Personal COBOL, a version of the language for the IBM PC that lists for only $299.

For more information on *COBOL Animator* and Personal COBOL, contact the Marketing Department of Micro Focus, Inc., 1860 Embarcadero Road #235, Palo Alto, CA 94303.

THIS PC IS COOL, LIKE REAL COOL

Necessity is still the mother of invention. The latest proof comes from Analytic Information Processing (AIP), a California software development company that turned PC peripheral manufacturer when its PC didn't work.

When AIP was hired to design some private real estate management programs, the contractor gave the programmers a PC. AIP expected to run the PC 12 hours a day.

"The PC stopped several times a day," says Linda Baptiste, an AIP programmer. Among the myriad problems: the PC didn't feed information to the printer properly, the disk drives started unexpectedly, or the computer began generating random characters on the screen. Sometimes the PC froze entirely. "It was hard to tell if the problem was with the programs we were testing or with the PC," Baptiste recalls.

Tracking the computer errors was no better. None of the wires were loose, and the diagnostic tests didn't show any problems. More confusing, the PC began to work again every time the programmers took off the cover to look under the hood.

Finally, someone guessed that expansion cards working 12 hours a day in a closed box might get too hot—and that opening the machine would cool it off. The technicians outfitted the PC with a variety of expansion cards, then tested the circuits for changes in temperature and resistance. They found that overheating was less of a problem when the machine had all-IBM boards. "I think non-IBM boards come in marginally different sizes," Baptiste says. "Some may be slightly larger and block the air flow more than others." Baptiste suspects that the XT, with eight expansion slots, may run much hotter than the five-card PC.

AIP mounted a small fan on the PC's chassis, under the system unit cover. That lowered inside temperatures by as much as 15 degrees—and rejuvenated the AIP PC. In addition to getting the real estate work done, AIP became a part-time PC-peripheral manufacturer.

Although sales are not yet spectacular, Baptiste hopes the fan—marketed as PCool—will provide a fairly simple solution for people with hot PCs. "One man said he'd cut a hole in the top of his PC to cool it off," Baptiste says. Another PC owner reported that he kept a can of Freeze Brain handy for cooling off his PC.

Information on the $99.95 PCool is available from Mary Boal, product manager, at 415-837-2803. ■

CALENDAR OF EVENTS

DATE	LOCATION	EVENT	CONTACT	COMMENT
January 23-25	Hacienda Resort Hotel Las Vegas, Nevada	Teaching Math With Microcomputers	National Council of Teachers of Mathematics (NCTM) Seminar Series 1906 Association Dr. Reston, VA 22901 (703) 620-9840	Seminars informing educators at all levels about using microcomputers to teach math.
January 27-29	Cincinnati Gardens Exhibition Center Cincinnati, Ohio	Computer/Electronics High Tech Show	High Tech Show (513) 351-9112	Displays of hardware and software.
February 7-10	Sheraton-Twin Towers Hotel Orlando, Florida	Workshops in 1984 Technology/Florida Instructional Computing Conference	David Brittain, Director Office of Educational Technology Knott Building Tallahassee, FL 32301 (904) 488-0980	Conference on using computer technology to improve education.
February 20-22	Los Angeles Convention Center Los Angeles, California	1984 Office Automation Conference	American Federation of Information Processing Societies, Inc. 1988 Preston White Dr. Reston, VA 22091	Emphasis on office automation.
February 21-23	Louisiana Superdome New Orleans, Louisiana	Softcon	Northeast Expositions 822 Boylston St. Chestnut Hill, MA 02167 (800) 841-7000	Software industry trade fair.

If you're like most people, you naturally assume that IBM personal computers are so advanced they practically run themselves. Plug it in and off it goes. Solving problems, making work easy, counting new profits while you drift off with headphones and Vivaldi.

Until you own one. And a fistful of software. Soon it becomes a battlefield of tedious typing, conflicting commands, picky protocols

Grasp victory Get ProKey.™

ProKey is a unique software program that actually operates your favorite software including WordStar, Visicalc, Lotus 1-2-3, dBase II and most others.

With ProKey you can recall frequently used phrases, headings, names, entire scripts with a single stroke. Accurately.

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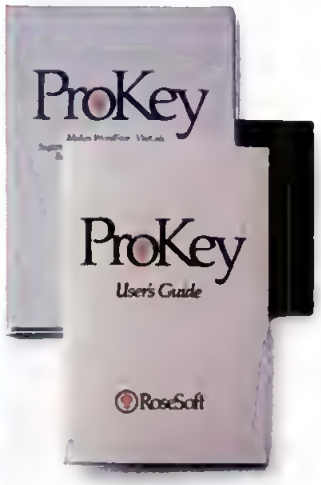

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To run ProKey, you'll need an IBM Personal Computer or workalike, DOS (any version, including 2.0), and 64K of RAM (WordStar requires 96K)

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PRODUCT REVIEW

TK! SOLVER TAKES ON A NEW LOOK

TK!Solver was created by the designers of *VisiCalc*. Although both programs use similar commands, this equation solving-program is rather different from a spreadsheet. A new version of the program, *TK! Solver 1.2*, is now available. The original version was reviewed by Mark Zachmann in *PC*, Volume 2 Number 4 ("The Versatile Variables Of TK!Solver").

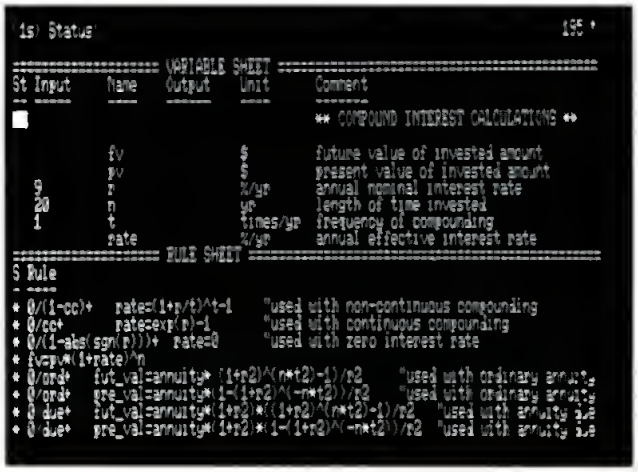
What can you do with *TK!Solver*? A large set of simultaneous equations can be defined on a *TK!Solver* rules sheet. On a variables sheet, values can be specified for any combination of the variables. Then, when you type an exclamation mark (!), the program will output all the unspecified variables that can be calculated by the direct method. If any variables remain unsolved, *TK!Solver* will try to find answers using an iterative method that makes a series of guesses to find values that best satisfy the equations.

Software Arts claims that the program now can make use of PC-DOS 2.0 and the XT's hard disk. The old version could not read files from the hard disk; the new version will recognize a hard disk if you call it "c:". The program diskette is still copy protected, but the overlay files can be copied to the hard disk, which makes it unnecessary to leave the program diskette in the drive after the start of each session. Also, the models in the separate *TK!SolverPack* diskettes are in files that can be saved on and used from the hard disk.

The most annoying thing about the old version was how long it took to respond to requests for help. That's been improved in the new *TK!Solver*. When I requested help on the topic "math," it took 16 seconds before the old version displayed the first screen of explanations. With the updated *TK!Solver*, I only had to wait 4 seconds.

The text on the help screens still are not as well organized as they could be. When I asked for an explanation of the Storage (/S) commands, a list of these commands began in the middle of a page of text explaining several topics. The last two Storage commands were on the next screen and there was no way to switch between the two pages.

While I used the program, I felt it took an awfully long time to digest changes to the models and to solve them—slow at least relative to most other programs' operations. While I waited, I could forgive the slowness if I happened to remember that *TK!Solver* was taking the time to perform tasks other personal computer programs hadn't done before. Operations are somewhat faster in the new version, but users still have to do a lot of waiting. They might spend the time contemplating how much faster equation-solving programs will run once the idea of this sort of software gets to be as old-fashioned as spreadsheets.



This screen shows portions of the Variables and Rules Sheets of the "Compound Interest Calculation" model found in the Financial Management TK!SolverPack. *This model deals with 12 variables and 16 rules, which can be specified and solved in any combination.*

On the whole, this update served the purpose of cleaning up the program, making it run faster and be usable with more systems. Perhaps a future version will take advantage of the 8087 math coprocessor's capabilities and double-precision numbers. *TK!Solver* is the sort of calculation-intensive program that could make great use of the 8087's power.

This update is available free of charge to all owners of *TK!Solver* who sent a license registration card to Software Arts. The manufacturer sent each registered owner one copy of the new program diskette; a second copy of the update is sent when the user sends back the two old diskettes in an enclosed mailer. That's a civil way to handle an update.

Software Arts provided two pages about the update to be placed in the program's manual. However, it didn't print sheets that could be swapped for pages in the old manual that contained outdated information.

It is still a rather complicated program to learn to use. However, the most challenging part of creating or using a *TK!Solver* model is understanding the field of expertise that lies behind the equations and formulas. If a user must deal with simultaneous equations frequently, the time that must be dedicated to learning and running the program should be well repaid by *TK!Solver's* flexible handling of calculations. ■

TK!Solver 1.2
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27 Mica Lane
Wellesley, MA 02181
(617) 237-4000
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Requires: 96K for PC-DOS 1.1 or 2.0

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PEOPLE

LUCIE FJELDSTAD

An innovative IBM manager combines a micro with a mainframe by putting the essence of a 370 into a PC XT box.

BY CONNIE WINKLER

"It's my baby," said Lucie Fjeldstad, truly beaming as she fielded questions at the recent announcement of IBM's high-end PC, the XT/370.

For Fjeldstad, the XT/370 was a tyke only in comparison to the development project she brought in the month before: IBM's latest mid-sized processor, the 4381, capable of about 2 MIPS (millions of instructions per second). The PC XT on which the XT/370 is built can run about 100 KIPS (kilo instructions per second) or about 1/20th the speed. "That's where I get the baby ratio," adds Fjeldstad.

And, unlike the 4381, where there were several layers of managers, directing several hundred employees reporting to her, on the XT/370 she was the sole manager of the project with 50 staffers. Fjeldstad, who is marking her 15th anniversary with IBM, is product manager of processor development for IBM's General Technology Division (GTD), which develops and manufactures mid-sized systems, primarily out of Endicott, N.Y. With a bachelors and masters degrees in economics, she has moved through the IBM ranks from doing operations research in Palo Alto, to managing giant programming projects in San Jose, to planning posts within GTD.

Fjeldstad did a neat thing within IBM. She melded the mainframe and micro worlds by putting the majority of the

key instructions from the System/370 central processing unit onto a board. And that board was slotted into the XT, along with an additional memory board.

Serious data processors have been dreaming for years about putting a 370 on a chip and indeed, IBM engineers talked about it several years ago in the company's *Systems Journal*.

"I'm bull-headed and stubborn," acknowledged Fjeldstad. She likens herself to a nimble running back: "I look for the hole in the line. A lot of it is experience."

"If you hit the line the first time and there's no hole, you find another way," she offers by explanation of how she was able to bring together the evolutionary 370 world and the revolutionary personal computer sides of IBM.

The actual XT/370 project took 14 months after she convinced higher-ups that the PC XT was the box for this innovative product. The PC box provided the best leverage for the new product from a cost/effectiveness point of view, told Fjeldstad.

This cost/benefit or requirements planning is Fjeldstad's forte and it's the job she was doing for the GTD before moving up to product manager and she talks a lot about it. It's balancing the requirements of the market and users against the engineering, manufacturing, marketing and revenue requirements within IBM. "Timing is key. You have to do it when the time is right," she says about delivering product to customers. "If I didn't do it, someone else would."

Picking the PC as the vehicle presented problems for the XT/370 designers and programmers: They couldn't "add a wire" or "change a line of code." Adds Fjeldstad, "it's difficult to tell a designer or developer, 'Don't go add on anything.'"

To make products like the XT/370 happen, Fjeldstad finds she spends 60 percent of her day planning meetings, 40 percent checking products status, 20 percent on personnel matters such as appraisals and reviewing who's happy in their job or who're the top candidates for another job, and 40 percent on phone calls. That adds up to more than 100 percent, to make Fjeldstad's point.

She spends 12 hours a day in the office, either in Endicott or in one of IBM's headquarters locations in Westchester County, N.Y.

A skier and tennis player, she uses a sports analogy to explain: There's nothing wrong with an athlete who spends 50 hours a week training, but someone who spends that much time working "is sick."

"I like to work, too," said Fjeldstad. "It's fun."

That "pitch-in" attitude comes from growing up on a ranch in northern California. "It didn't matter if you were a boy or girl. There were always cows to be milked or fields plowed. I was always in the business," Fjeldstad recalls. "My dad made very sure that we were involved."

The day after the XT/370 announcement—after the press conference was recreated for the entire project group—Fjeldstad felt dispirited.

"I felt a letdown," she recalls. It was a numb feeling, one that she had postponed the month previous at the 4381 announcement because the baby was still to come.

The day after was a day she had booked only 100 percent. She went home early.

The next day she got booked back up to 140 percent. "That's the best way to do it," she adds. "We have learned a lot. We know what we did right and wrong. It's time to do another." ■

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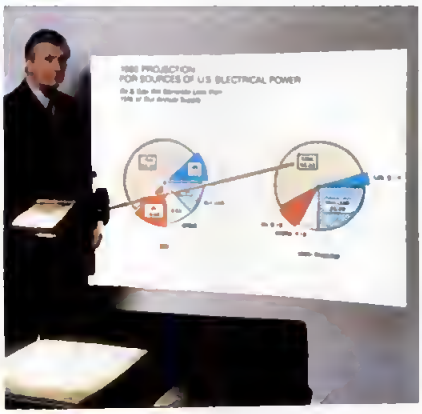

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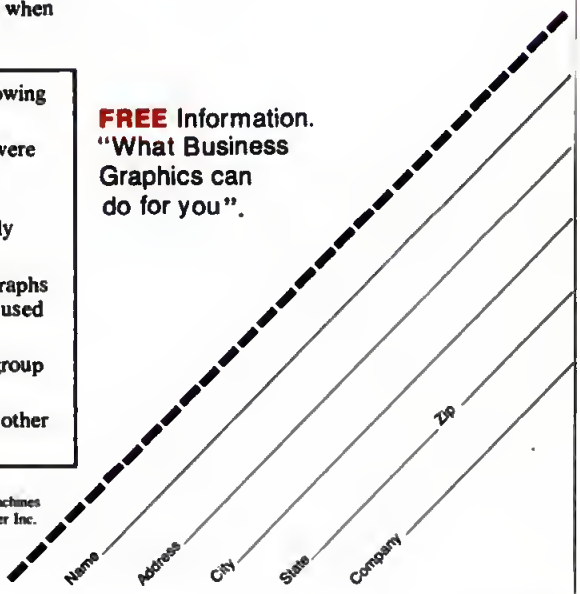

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A New Year And A New Look

The arrival of 1984, with all its ominous overtones, brings only good things to PC Magazine readers, including a revamped magazine and a renewed commitment to serving you.

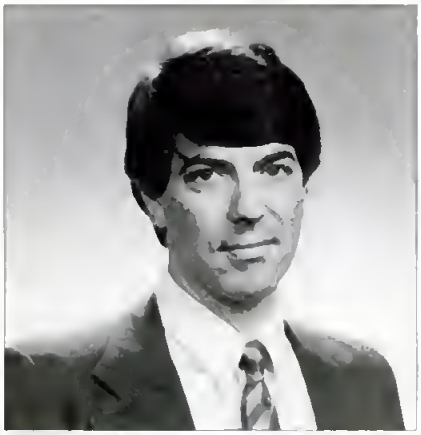
It's 1984. That date has taken on such ominous connotations that everyone, whether they've read Orwell or not, pauses to think about where society and technology are heading. Is Big Brother here, or lurking in the shadows just around the corner?

Some chose to ignore the foreboding side of this new year by saying it's a year like any other. Others, zeroing in on our subconscious sensitivities, are capitalizing on 1984 by stamping it on our T-shirts—and on our minds.

At *PC*, because we are so entwined with technology, we work doubly hard to be open to both sides of the question. In this first issue of 1984, we present several perspectives on the deep and complex question of where technology is taking us. And we further explore the unavoidable Orwellian questions of 1984 with views from civil liberties lawyer Dorothy Samuels, and Jay Bloombecker, director of the National Center For Computer Crime Data.

The year 1984 also has new meaning for *PC Magazine*. We are bringing you a markedly new (dare we add, improved) magazine, put together by a bigger, experienced team of editors and writers. This first 1984 issue is dramatically different than any you've seen before.

The biggest change is that *PC* is going biweekly: Subscribers will now be receiving *PC* every two weeks. This frequency allows us to add "PC News," a section with a newspaper framework that allows us to include late-breaking stories. The 12-page "PC News" will be the last section of the magazine to go to the printer. But we hope it will be the first section you turn to for timely, informative reports on PC developments.



Bill Machrone

We present several perspectives on the deep and complex question of where technology is taking us.

The biweekly format gives us more room for in-depth and comprehensive articles that will truly add to your general and technical understanding of the PC.

We know that you, our readers, are becoming increasingly sophisticated in your use of the PC. As professionals and managers in business, as lawyers, as writers, as doctors, as financial analysts you want to apply the PC to your jobs. Therefore, we've added special columns such as "Writing," "Medicine," and "Business/Finance" to discuss how PCs are being used on the job, and how you can use yours.

These regular features will delve into vertical applications for the PC that might not be of interest to more general PC users. Some columns, such as those on writing and on telecommunications, will appear in every issue. Others will be scheduled as needed to keep you abreast of field-specific developments. The writers are opinionated, interested, and knowledgeable insiders.

Our new guest editorials will draw on the expertise and opinions of industry leaders (or adamant followers) to give you new looks at the dynamic world of personal computers.

This first 1984 issue of *PC* also looks different. New typography and design by

computer accessories

that organize, protect, and gain space...

NEW!

INCREASE COMFORT

ANTI-GLARE SCREEN FILTER
Model #AG820 **$35.00**
Reduce eye strain and increase operator comfort with this screen filter for the IBM PC monochrome monitor. The filter reduces excessive glare from overhead lighting. It fits snugly into the face of the monitor due to the vinyl foam bordering the narrow but sturdy aluminum frame. The screen is made of black nylon monofilament fibers in a square weave.

ORGANIZE & PROTECT

ROLLTOP 100 DISK FILE
Model #RT100 **$36.00**
Twice the capacity (100 - 5-1/4" Disks) of the leading "flip top" file. But it takes no more desk space! An outstanding design that combines contemporary styling with the elegance of a rolltop enclosure and a textured buff plastic body. It includes 10 diskette dividers and anti-skid feet.
Locking Model #RT100L - $46.00

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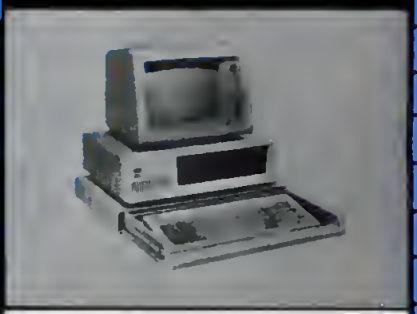

KEYBOARD STORAGE DRAWER
Model #SS610 **$89.00**
This is the perfect solution to narrow credenzas or typewriter return locations. The keyboard drawer rolls smoothly on industrial strength ball bearing slides. The drawer locks open for stability and has a built-in wrist rest pad. The 20 gauge metal frame has a baked enamel grey finish with the drawer in putty to match the IBM PC color scheme. Holds any keyboard 2-3/4" (h) x 19-3/4" (w) x 9-1/2" (d).
$5.00 Shipping/Handling*

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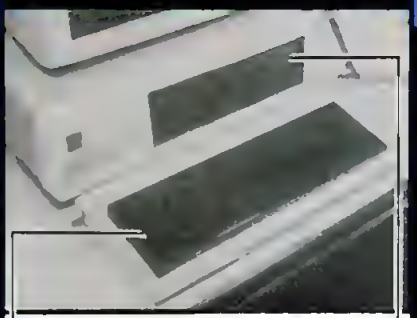
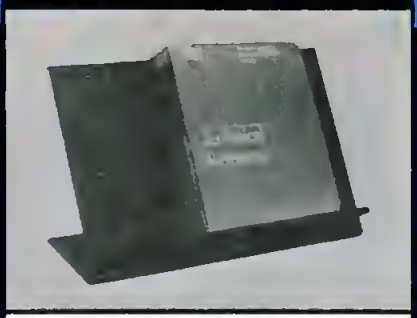


DISK DRIVE COVER
Model #DC310 **$10.00**
A cover to protect the IBM PC disk drive area from dust and dirt. Molded in black plastic to match the IBM styling. A vinyl foam seal prevents harmful elements from entering the disk drive area.

KEYBOARD COVER
Model #KC210 **$12.00**
Protect your computer keyboard with our dustcover made from rigid smoked bronze plastic. A low silhouette design that fits keyboards such as the IBM PC and the Keytronics keyboard.

INCREASE COMFORT



EASY-VUE EASEL
Model #EV410 **$20.00**
The ultimate design in a manual easel. Provides ideal viewing angle. Protective pads prevent skidding. 10" x 15" in size, it even properly displays an 8-1/2" x 11" three ring binder. An elegant accessory in smoked bronze, molded from tough durable acrylic.

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Model #PA900 **$40.00**
Work easier! Reduce glare and eye strain, eliminate neck craning with this sturdy CRT display stand. Completely stable 30° tilt and 360° turn without removing CRT. Attractive molded ivory hard plastic and steel construction. Rubber pads on top and bottom assure no slipping. Fits any CRT with feet separation less than 11" in width and 10-1/4" in depth.

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art director Mitch Shostak and his staff give the magazine a new, cleaner, crisper look: We hope you will find the editorial material more accessible and easier to read.

Finding Your Way

One of our most frequently heard pleas is for more page numbers to help you more easily sort through the magazine (admittedly a big chore). We have heard you and will do our best to let you know where you are in the magazine, or where to find the advertisement for the product you've been tracking down for 2 months. Our newly designed table of contents should also help you make the best use of your time in reading *PC*.

There's also a new look to the January masthead: The *PC* team has been expanded to bring you this new magazine.

Jon Lazarus, who's done a super job guiding *PC* as editor, has moved up—literally upstairs—to become editorial director of Ziff-Davis's Consumer Computers and Electronics Magazine Division. That's 11 magazines, to date. Good Luck, Jon.

As the new editor of *PC* I will be coordinating other staff members and working to bring you informative articles that span the range of PC applications and interests. Look for more technical articles, more hands-on comparisons of new products, and some ground-breaking articles, the likes of which have never been seen before.

The Newest Member

The latest member of our magazine family is *PCjr. Magazine*, announced with the unveiling of IBM's home-education-office computer, PC*jr*. At the helm of PC*jr*. is Corey Sandler, former executive editor of *PC*, who played such a key role in making PC happen in 1983.

Although Corey has moved down the hall, he hasn't left the pages of *PC Magazine:* His "Sandler's Screen" ruminations will be found in alternating issues of *PC*, and he will continue to contribute to "PC Arcade" on a regular basis.

Shaping the biweekly issues of *PC* is now the joint responsibility of Mike Edelhart and Connie Winkler, our new executive editors. Mike will be working with articles and Connie will handle PC News and the columns.

A top-notch staff and knowledgeable free-lance writers produce the best possible magazine for you.

Mike and Connie bring to *PC* a wealth of computer publishing experience. Mike has been an editor at *OMNI* and *Technology Magazines* and most recently was the computer power behind *Enter*, the computer magazine for teenagers from Children's Television Workshop.

He's a prolific writer, with two computer books off the press this year: *The Complete Computer Compendium* and *The OMNI-Macmillan Encyclopedia of On-Line Databases*.

Connie most recently tracked the computer information processing industry from the perspective of associate editor at *Management Technology*. She was formerly editor of *Computer Careers News* and a correspondent for *Computerworld*; she has worked for IBM, and has a new book out, *The Computer Careers Handbook*.

Connie and Mike are working hard to bring together a top-notch staff and knowledgeable free-lance writers to produce the best possible magazine for you. As IBM's announcement of the PC*jr* demonstrated, we are all working at top speed. Within 2 days we pulled together a special 8-page section in our December issue to give you the latest information on this incredible machine from IBM.

Our technical staff is growing too, so we can provide the best in-depth comparison reviews, and more of them. As the former technical editor, I am committed to presentations that will be tutorial to newcomers, informative to the experienced, and interesting to all.

Pushing us all on to better and bigger stories and projects is Paul Somerson, who, in his new role as Special Projects Editor, will give you his unabashedly biased views of everything from IBM's Enhanced Basic for the PC*jr* to Scotland (from which he just returned) to the future of the human race in 1984.

Over the past several months, we have built a test laboratory with enough sophistication to wring out just about any PC-related product. We are committed to bringing you well-founded comparative reviews of hardware and software, backed up by the solid technical details you need to make informed purchasing decisions. You'll see what makes the IBM PC and its peripherals tick, from the power line through the processor circuitry to the characters on the screen and finally to paper. Everywhere along the way, there are decision points for you. Do you need an uninterruptible power supply? Are there differences between multifunction boards? Do removable Winchester disks work in the real world? We'll answer these questions and many others in the coming weeks. We won't neglect the software side, either. There's a wealth of new software out there and more coming each day. As easy as it is to get into a comfortable rut with a favorite product, we'll show you the newest and best, especially the exciting new integrated products and sophisticated database managers.

This new and enhanced lineup of people and editoral product underscores our commitment to being the best computer publication—whether you're a PC owner at home or a business user.

Throughout 1984 and beyond we welcome your ideas, comments, gripes, and brainstorms. We will do everthing possible to represent you in the pages of the "new" *PC Magazine*. ■

Plain Talk About Printers...

DOT MATRIX

There've been some big changes in IBM-PC printer compatability. Okidata's new Plug-n-Play ROMs (see below) make a Microline 92, 93 or 84 fully compatible with the IBM-PC, screen dump graphics & all. If you're interested in full compatability, that's the package to get. We expect that other printer manufacturers will offer similar upgrades shortly.

C. ITOH

Prowriter

C. Itoh's **Prowriter** (120 cps) features 10, 12, & 16 cpi, a proportional/correspondance quality font, double strike, double-width, sub/super scripts, dot graphics (180 x 144 dpi). The **Prowriter 2** is the 136 column version.

Prowriter **$399.88**
Prowriter 2 ..... **$719.88**

EPSON

RX/FX Series

The **FX-80** (160 cps) has a correspondence font, 10, 12 & 17 cpi, italics, double-strike/width/emphasis & dot graphics, plus a 2K buffer. Friction & pin feed is standard; the adjustable tractor is optional & cost extra. The **FX-100** is the 136 column version & includes the adjustable tractor.

The **RX-80** & **RX-80 F/T** (100 cps) are upgraded versions of the MX Series.

Epson FX/RX ..... **$CALL**

MANNESMANN TALLY

MT-160 L/180 L Spirit

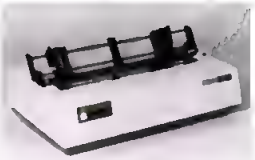
The **MT-180 L** (180 cps) features 10, 12, 17 & 20 cpi, a correspondence font, italics, enhanced/boldface print, double-width, sub/super scripts & underline, friction/tractor feed. Parallel & RS-232C interfaces standard. The **MT-180 L** is the 136 column version.

The **Spirit** (80 cps), Tally's new, low cost draft printer, has 10, 12 & 17 cpi fonts, italics, friction/tractor feed, and a unique square-wire printhead. 80 columns & parallel only.

MT-160 L **$849.88**
MT-180 L **$849.88**
MT-Spirit **$329.88**

OKIDATA

Microline Series



The **Microline 92** (180 cps) is ideal for word processing. It features 10, 12 & 17 cpi, a correspondance font, double-width, emphasis/boldface, sub/super scripts, underlining, pin/friction feed (tractor is optional on the **92**) & dot-addressable graphics (120 x 144 dpi). The **93** is the 136 column version. Parallel interfaces are standard; the RS-232C interface is optional.

The **Microline 84** (132 col) is the Step 2 version, featuring 200 cps at 10, 12, & 17 cpi (w/double-width), all with a correspondance mode & dot addressable graphics. Parallel or RS-232C interfaces available.

A new PROM called **PC Plug-n-Play** turns a **92, 93** or an **84** into an IBM-PC compatible printer, with full capabilities. You will sacrafice a few features (like 12 cpi) but the PROMs are worth it if total compatibility is your goal.

The **Microline 82A** (120 cps) is a date crunchers. Features 10 & 18 cpi (5/8 double-width). Dot-addressable graphics are optional. The **83A** is the 136 column version.

Microline Series ..... **$CALL**

PANASONIC

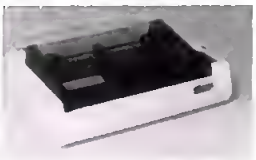
KX-P1090

A smart entry by Panasonic, the **KX-P1090** (80 cps) features 10, 12 & 18 cpi, italics, double-width, half-width, enhanced/bold print, dot graphics (120 x 144 dpi), friction/tractor feed & a 4,000,000 character ribbon. The Epson-compatible escape code sequences make it easy to install. Quiet printing & a sharp design make it ideal for home or office. Nationally serviced by Panasonic.

KX-P1090 ..... **$339.88**

STAR MICRONICS

Gemini 10X/15X Delta 10/15



The **Gemini 10X** (120 cps) features 10, 12 & 17 cpi, italics, a correspondence font, double-width, emphasis/boldface print, sub/super scripts, underlining, graphics (120 x 144 dpi), a 1K buffer & friction/tractor feed. The **Gemini 15X** is the 132 column version.

The **Delta 10** (160 cps) features both parallel & RS-232C interfaces, & an 8K buffer, plus all the 10X features mentioned above. The **Delta 15** is a 136 column version.

Gemini 10X **$309.88**
Gemini 15 ..... **$459.88**
Delta 10 ..... **$529.88**
Delta 15 ..... **$CALL**

TOSHIBA

P1350

An exceptional printer that produces the best near-letter quality we've ever seen. The P1350 prints at 192 cps (100 cps in near-letter quality), & features 132 columns, 10 & 12 cpi (plus double-width) & a near-letter quality font with proportional spacing. It has all the sub/superscripting features you'd expect, plus dot graphics (180 x 180 dpi). Parallel or RS-232C interface (specify).

P1350 ..... **$1759.88**

Other Dot Matrix Printers We Carry

ANADEX

DP-9501 ..... **$1189.88**
DP-9620 ..... **$1259.88**
DP-9825 ..... **$1389.88**
WP-6000 ..... **$2279.88**

DIABLO

Series 32 ..... **$1049.88**

IDS

Prism 80 ..... **$1079.88**
w/4-color **$1439.88**
Prism 132 ..... **$1239.88**
w/4-color **$1869.88**
MicroPrism **$529.88**

INFORUNNER

Ritemen **$349.88**

LETTER QUALITY

The new, low-speed letter-quality printers are making quality affordable. And the high-speed models are coming down in price too. Still, get a dot matrix printer for drafts & as a backup.

C. ITOH

A10 Starwriter F10 Starwriter Printmaster

The C. Itoh **Starwriter** (40 cps) features 10 or 12 cpi, sub/super scripts, underlining, 8/8 lpi, 1/48" line feed, 1/120" horizontal resolution. It uses Qume code & Diablo wheels & ribbons. The **A-10 Starwriter** has the same specs, but it prints slower (20 cps). The **Printmaster** has the same specs, but it prints faster (55 cps). Both the **Tractor Feed** and the **Sheet Feeder** fit all three models.

A-10 Starwriter **$609.88**
F-10 Starwriter **$1219.88**
Printmaster **$1589.88**
Tractor Feed **$289.88**
Single Bin Sheet Feeder (A10/F10) **$819.88**

SILVER REED

EXP-550/500

The Silver Reed **EXP-550** (170 cps) is a 132 column letter-quality printer with 10, 12 or 15 pitch, sub/superscript, underlining and **true** Diablo 1610 emulation, making it compatible with most word processing software. It's friction fed, and it features a page injector; an optional tractor is also available.

The **EXP-500** (120 cps) is a 100 column letter-quality printer with the same specs as the **EXP-550**, but slower and without page inject.

EXP-550 (Parallel) **$899.88**
EXP-550 Tractor **$139.88**
EXP-500 (Parallel) **$489.88**
EXP-500 Tractor **$129.88**

NEC

Spinwriters

The new **2000** Series are slower (20 cps), but they've retained all the quality of the 3500/7700 Series. Uses the same thimbles & ribbons.

2010/2030 ..... **$879.88**
2050 ..... **$999.88**
3530 ..... **$1839.88**
3550 ..... **$1899.88**
7710/7730 ..... **$2159.88**

SMITH-CORONA

Messenger

The **Memory Correct III Messenger** (the full name) is ideal for the home or small office. It combines the features of an electric typewriter and a letter-quality printer. It features 12 cps, 3 pitches (10, 12 & 15), variable line spacing, 10.5" writing line, backspacing & auto-correction. It comes complete with parallel/serial interface.

Memory Correct III Messenger **$629.88**

Other Letter Quality Printers We Carry

COMREX

CR-1 ..... **$849.88**
CR-1 Tractor **$104.88**
CR-2 ..... **$509.88**
CR-2 Tractor **$94.88**

DIABLO

820 (RS-232C) **$999.88**
830 (PC) **$1079.88**

QUME

Sprint 11+ **$1539.88**

MONITORS

NEC

JB-1205/1201M

Slick design & slick specifications. The NEC **JB-1205M** is the amber version. The **JB-1201M** is the green screen. Both offer 80 columns on a 12" diagonal screen, with an 18-20Mhz bandwidth and a crisp, clear display.

JB-1205M (12" amber) **$179.88**
JB-1201M (12" green) **$189.88**

USI

PI-3 (12" amber) **$189.88**

AMDEK

300G (12" green) **$149.88**
300A (12" amber) **$164.88**
310A (12" amber) **$199.88**

PRINCETON GRAPHICS

HX-12

The **HX-12** is one of the finest RGBs available. 16 colors (using NEC's tube), 890 dots by 240 lines (480 interlaced) & 15MHz bandwidth. Comes with its own cable.

PGS HX-12 ..... **$499.88**

QUADRAM

QuadChrome

The **QuadChrome** has the same spec's as the HX-12. Same price too.

QuadChrome **$509.88**

Quadrsm Video Boards

QuadColor-1 ..... **$199.88**
QuadColor-2 ..... **$219.88**

USI/PARADISE

MultiDisplay

Supports 32K graphics, with composite, RGB, PC monochrome display **and** a parallel port.

MultiDisplay **$479.88**

TECMAR

Graphics Master

192K for RGB or composite display, supporting 480 non-interlaced RGB output.

Graphics Master **$579.88**

EAGLE COMPUTER

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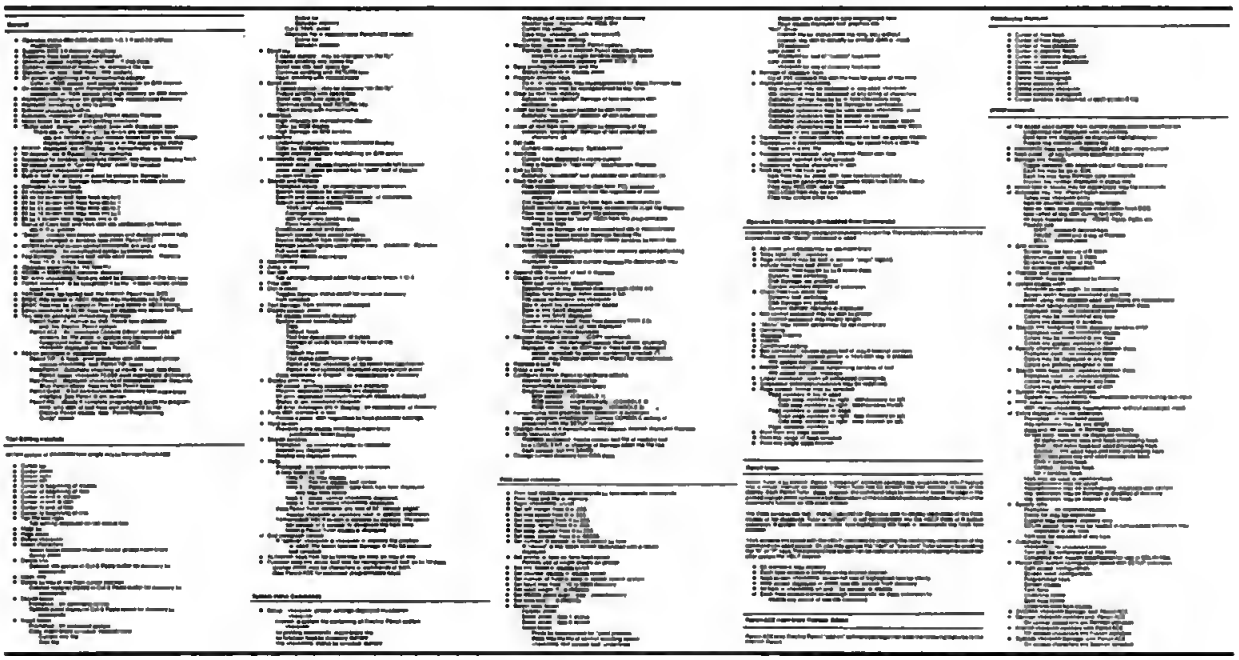

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Letters To PC

More Language Talk

Bill Machrone's article on languages ("Microlinguistics: Languages For The PC," *PC*, Volume 2 Number 4) was both timely and informative but left several key questions unanswered.

It was not clear which of the 10 languages Machrone considers suitable as general purpose languages, as opposed to those he considers more suitable for specific tasks.

The term "tight code" was not explained. Does it mean that the object files for some compiled languages will be smaller than for others accomplishing the same task?

One last point: What technical mystery prevents companies from providing interpretive (interactive) debugging capability as a utility with language compilers?

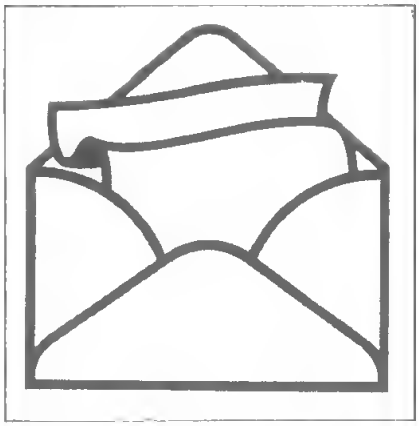
Wayne Sefton
Mendocino, California

Bill Machrone replies:

I'll have to refer you back to "Summing it Up" for the best general-purpose languages. BASIC, Pascal and Logo will give you the fastest return on your time and effort investment, while C and PL/I will require more study. They are all general purpose. dBase is mostly for records management functions and the others are either commercial standards or for more specific applications.

"Tight code" is a sloppy phrase. In one context it means well-written, economically expressed source programs. The other meaning refers to the size and efficiency of the compiler's output.

Many have asked your final question and a few have even answered it. One such product is Micro Focus's COBOL Animator. Another is Morgan Computing's Professional BASIC. We'd be interested to hear about other products that include this capability as a utility.



Your concern about reader's letters will certainly disappear after the articles on languages in the September issue. Most experienced programmers will find areas of disagreement with the opinions expressed—and so do I!

I'm glad you presented two views of BASIC; one author suggested that it offered portability (an incredible opinion!) and another pointed out the truth: there are many versions of BASIC that are almost impossible to translate. There are tremendous differences in file structure alone.

COBOL seemed to be maligned as a micro language. Believe it or not, I chose COBOL as my business language. Why? Here's the rundown: It offers the greatest portability in running on numerous systems. Screen handling techniques are built into the language. Excellent file handling techniques (specifically indexed files and indexed files with duplicates) are built into the language and are extremely easy to use, virtually eliminating sorting. Record lock-out techniques are built into the language for multi-user systems. The same programs can frequently be used even if additions are made to the number of fields in a record, thus minimizing time spent on program modifications. Finally, the compiler is easy to use.

Language purists frequently criticize the GOTO statement. Frankly, some applications are virtually impossible to write, or require gigantic increases in the amount of code. For example, in our business applications, we allow users to enter a control code and jump back to previous fields on a screen if they see they have made an error. The GOTO is almost imperative.

A highly structured language is not necessarily a practical solution to the needs of business programming. I'll be the first to admit that despite my praise of COBOL, it has its own limitations and programmer frustrations. A near-perfect language simply doesn't exist at this time.

Tom Stover
Gering, Nebraska

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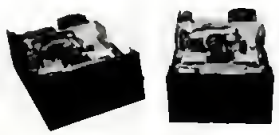

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LETTERS

Encore, Encore!

Paul Somerson's lead article, "Goblins, Gremlins, And Glitches," really hit the mark (*PC*, Volume 2 Number 5). I have lived with my PC, Quadboard, and *WordStar* (plus *MailMerge* and, thank goodness, *ProKey*) for nearly a year, and the episodes all rang true for me. Oh, so true! Let's see more from Somerson. I like his easy, cogent style.

Thomas R. Thurmond
Vacaville, California

King Me

Thank you for reviewing *Checkers for Beginners* ("PC Arcade," *PC*, Volume 2 Number 5). I created the program to entertain my children back when there was little game software to run on our family's new PC.

The programs first skill level, which Corey Sandler reviewed, was designed to make the PC a relatively easy opponent to beat, so that young players can feel a mastery over the computer instead of feeling intimidated by it. The second skill level, which was not reviewed, has many more advanced playing features to entertain and challenge more seasoned players.

Writing the program on the versatile and responsive IBM PC was truly a labor of love and I am pleased that it provides entertainment for others.

John E. Hoel
Springfield, Virginia

I chuckled when I read Corey Sandler's comment that the IBM checker program made him wait 8 seconds before he beat it. Think a moment—that's why that feature exists!

Seriously, I used to have a game of micro chess for an Apple II computer (I now have an IBM-compatible Zenith Z-100). When the game checkmated me, it made a sound like "Heh Heh Heh Heh." When I checkmated it, however, it sounded like a dying cat. The words "You win" sheepishly appeared on the center of the screen.

I also liked Sandler's story about the horse race predictor program ("The $2 Sure Thing," *PC*, Volume 2 Number 4). X=5 indeed.

Dennis Baer
Farmingdale, New York

Keep Biding Your Time

I thoroughly enjoyed David Whitehouse's chess game reviews ("Biding Your Time With Computer Chess," *PC*, Volume 2 Number 4). Being a fair chess player (1600 or so) and the owner of a couple of IBM PCs, I have been eagerly awaiting a chess program worthy of a 16 bit processor. Whitehouse's article convinced me to keep on waiting.

I recently saw a review in another magazine of a different chess program for the PC, *Bluebush Chess*. It received high marks, but I'm afraid the reviewer didn't go into as much depth of analysis as Whitehouse did in *PC*.

I would value Whitehouse's opinion on *Bluebush Chess*.

Dean Ballard
Seattle, Washington

David Whitehouse replies:
I had a chance to look at Bluebush Chess *about a month ago, and it is definitely better than either* Chess Partner *or* SPOC, *the programs I reviewed in PC. The graphics are good, it only uses 64K RAM, and it has a fair variety of levels. Still, it needs improvement. There is no opening "book," and it cannot go back on retrieve games from the disk. Worst of all, the game will repeat itself at the same level if you let it. I quickly found a line in the Vienna game where I can repeatedly play the same game out to mate. So while it's an improvement, there are certainly even better games to come.*

Although you can't use your PC for them, I would still recommend one of the standalone games.

Of Mice, Moths, and Smoke

In Bill Machrone's article "Run It Till It Breaks" (*PC*, Volume 2 Number 5), he says, "The accessory that makes me laugh the most is the cover that fits over the drive." While disk drive covers may be for "compulsives," Machrone may be interested to learn that people have purchased covers for other reasons: mice, moths, and palmetto bugs had entered their PCs through the drive opening.

Also, my partner's father had a small fire in his office and found that the disk drive cover prevented smoke damage.

These PC predators do exist. Don't laugh at the usefulness of the product; you might need it someday.

Nat Hellman III
President,
MicroComputer
Accessories, Inc.
Los Angeles, California

And The Winner Is . . .

After reading Lindsy Van Gelder's admittedly grouchy review, "Programs That Polish The Processed Word" (*PC*, Volume 2 Number 5), I pulled out Volume 1 Number 7 and reread Lawrence Magid's review of the *Random House Proofreader*.

Sure enough, all the reasons that I bought *Proofreader* after first reading Magid's review are still true.

As one who edits and proofreads the technical documents of a systems programmer-turned consultant, I have found the *Proofreader* indispensable. Systems programmers, by genetic composition, are poor spellers who quite often invent words when their nontechnical vocabulary abends.

True, the *Proofreader* is slow (compared to what?). True, one must build an auxiliary dictionary peculiar to one's profession. True, word tense and usage are not checked. However, on a

(continued)

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recent weekend I spent over three hours reviewing a 66K design document. The *Proofreader* arrived Monday morning, and I quickly discovered 56 errors that I had overlooked during several readings.

The document was presented to IBM the following day in a conference room full of people. The embarrassment saved on this one project alone more than justified the modest cost of the program.

Of course, professional writers are more proficient at this sort of thing than us plain old humans—as they should be. However, all of Lindsy Van Gelder's grouching aside, I can wholeheartedly recommend *Proofreader*, or any good spelling checker, as an indispensable tool for generating documentation you don't have to be ashamed of. I plan on ordering the *Electronic Thesaurus* as soon as I finish this letter.

Now, as soon as Dick Brass gets his grammar program to the point where it can be used with any word processor, I won't have to worry about my grammar no more.

Tons of praise for an excellent magazine.

J. David Gardner
Mauldin, South Carolina

Congratulations, J. David Gardner! You've written the winning "Better Letter." We hope you can find a word processor that works well with the Proofreader.

Keep those letters coming, folks. We love to get mail.—Ed.

Unix or Bust

Where are your journalistic gumshoes? I'm tired of waiting to find out when (or is it if?) PC-DOS will be transformed by the magic wands of IBM and Microsoft into a true Unixoid. Should I buy IBM's C compiler now, or wait? Should I go whole hog and buy a Unixoid-cum-C system now? Go for broke and pick up Xenix on a 68000 board?

I want it both ways. An old and devoted lover of Unix on PDPs, I'm not hooked on all the glorious software that runs under PC-DOS (not to mention the hardware). If I wait, will I get a Unix that will still let me play with dBase II and *SuperCalc*? Will they throw in Unix's *adult* word processors and text editors, *Ex*, *Vi*, and *Nroff*? Will the C compiler utilize the 8087? Will all the software vendors update to Unix? Will DOS 3.0 cost $2,000?

Come on, you guys. Tell me the future. Tell me what I want to hear!

David M. Graber
Three Rivers, California

We're C fans and PC fans, but Unix may be asking too much of that wheezing 8088. Still, we'll review Venix, QNX, Coherent and similar products in upcoming issues. For now? Redo your DOS 2.0 shell to look like Unix and give the new Digital Research C a try. By the way, Ex *and Vi are adult text editors the way an AWACS is an adult flying machine—idiosyncratic, rather overspecialized, but effective in its place.—Ed.*

Compu-Cheaters

Last week our company received a letter from a firm called Compu-Chart Computer Services in Coral Springs, Florida. The letter was advertising the service this firm provides: They will write a "favorable review" of not less than 1000 words and send it to all major computer publications. The cost to the software company of this review is $250.

The letter states: "Since most magazines must adhere to a certain ratio of ads to editorial content, independent reviews and articles are generally welcomed and usually get published soon after they are submitted. This is FREE advertising!"

We have always enjoyed your publication and have found your articles both informative and factual. We hope that you are aware of this company and others like it, and we urge you to discourage them from such practices. We feel that these biased reviews, if published, will become a major liability to the computer software industry.

Mark W. Turner
Vice President, MTS Inc.
Niceville, Florida

PC goes to great lengths to ensure the objectivity of software and hardware reviews. We never accept reviews from public relations or advertising firms. Our reviewers are experienced in the fields they cover. They always have opinions and are not afraid to describe a product's shortcomings. We promote comparison articles whenever possible and generally review only commercially available products, not developmental or experimental versions.—Ed.

Once and for All

They say the third time is the charm, so perhaps the third attempt at the DOS CLS (clear screen) command will get it right ("User-To-User," *PC*, Volume 2 Number 2; "Letters to PC," Volume 2 Number 5). I'm afraid the corrected data given in James Anderson's letter was itself in error. Though I'm not as familiar with my Technical Reference Manual as Anderson, it didn't take me long to compare the two sets of data and figure out the correct set, which should read:

B9 00 00 BA 79 24 B7 07 B8 00 06 CD
10 BA 00 B7 00 B4 02 CD 10 C3

Somehow the B4 byte in Green's listing became BA in Anderson's, with rather curious results.

James H. Johnson
Alpharetta, Georgia

There's one thing that's worse than correcting a mistake: correcting a

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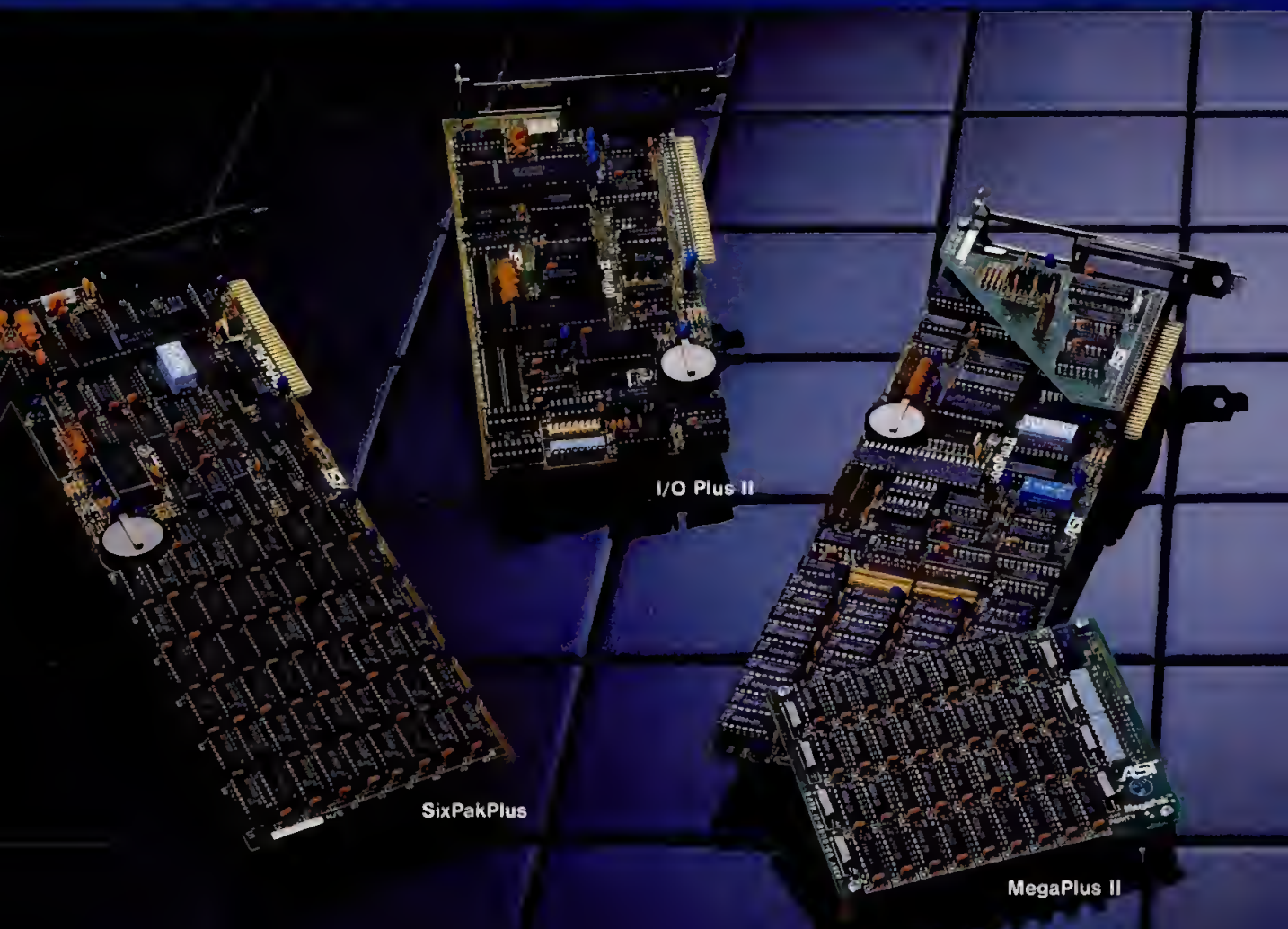
- **User Memory from 64K to 512K** — When added to your existing system memory, brings your PC up to its maximum of 640K. This enables you to run larger spreadsheets, create larger in-memory databases, or you can use the additional memory along with the supplied AST SuperPak™ software for print spooling or for simulating floppy drives to increase your PC's throughput.

- **Serial Ports** — By connecting a modem to a serial (async) port, your PC can communicate with other computers over telephone lines. By connecting a serial printer, you can obtain high quality print output. Other serial devices such as a plotter or mouse may also be connected to a serial port. The PC allows for the installation of up to two serial ports.



AST

Number One Add-On Products for IBM PC

Number One Add-On Products for IBM PC

Optional features may be added by the user at any time by installing an AST Research Upgrade Package.

All products come with extensive documentation as well as all necessary adapter cables.

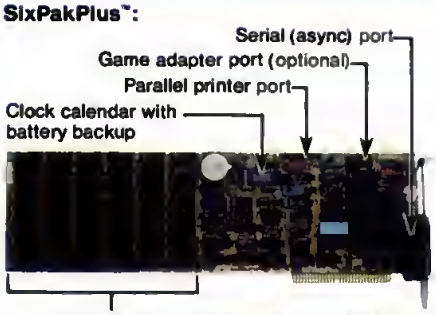
	MEMORY	Serial Port 1	Serial Port 2	Clock	Printer Port	Game Port	Bus Extension
SixPakPlus	X	X		X	X	X	
MegaPlus II	X	X	X	X	X	X	X
I/O Plus II		X	X	X	X	X	
ComboPlus	X	X		X	X		
MP Expansion	X						

PCnet is a registered trademark of Orchid Technology, Inc. AST-5251 is a product developed by AST Research, Inc. and Software Systems, Inc. of Jefferson City, MO. AST-3780 is a product developed by AST Research, Inc. and Wilmot Systems, Inc.

AST Research Micro-to-Mainframe Communications Products:

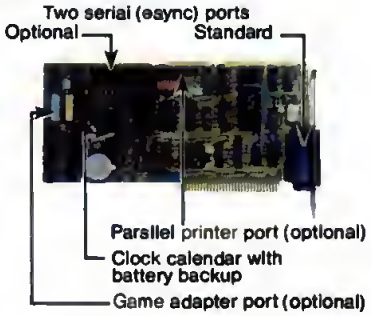
- **AST-SNA** — A family of five products that enable a PC to communicate with a mainframe via the IBM SNA protocol without the use of protocol converters.
- **AST-5251** — An interactive 5251 remote work station emulation package for use with the IBM System 34, 36, or 38.
- **AST-3780** — A hardware/software package which allows an IBM PC to communicate with a mainframe in 2780/3780 bisync protocol.
- **AST-BSC** — A hardware/software package that allows your IBM PC to provide all the features of a 3270 or 2770 terminal in bisync.
- **CC-232** — A programmable card that allows an IBM PC to communicate in async, bisync, SDLC or HDLC protocols.

SixPakPlus™:

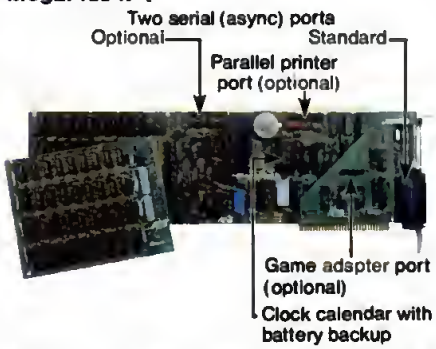


64K-384K of parity checked memory. Added to a PC or XT with a fully populated 258K system board, the SixPakPlus can bring the system memory to 640K, the maximum addressable user memory.

I/O Plus II™:

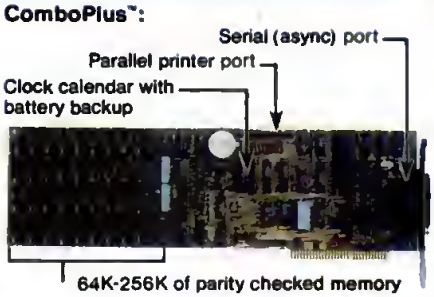


MegaPlus II™:



64K-512K of parity checked memory. The basic card expands to 256K, and with the MegaPak extension expands to an additional 128K or 256K of parity checked memory.

ComboPlus™:



MP Expansion Memory:

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4. Close the page and slip-sheet

Folded edge of the page

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Inverted Foldout slip-sheet

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    1. Front side touching the free page
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3. Slice the folded edge
4. Close the page and slip-sheet

1. Follow instructions on the other side

Inverted Back

GbsSlipBack-001B

Back

1. Follow instructions on the other side

Parallel Ports — The parallel port is used o connecting a parallel printer to your PC. A rallel printer typically uses a dot-matrix tput which is suitable for high-speed draft ality printouts. The PC allows for the in- llation of up to three parallel ports.

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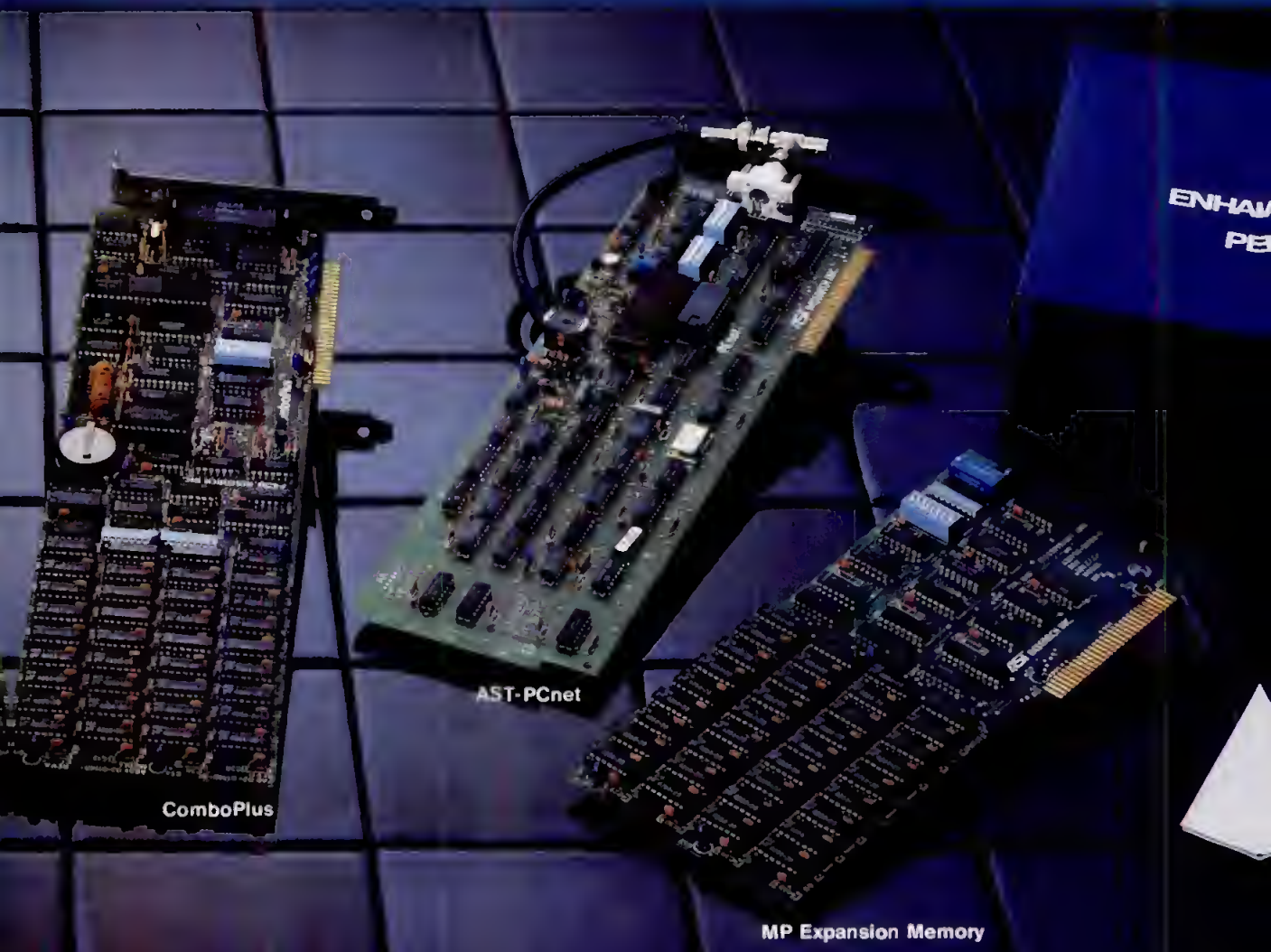
Game Adapter — The game adapter port ows you to connect an IBM-type joystick your PC so you can play the multitude of cade-quality games which take full advan- ge of the PC's graphic capabilities. Or you can use the joystick input for other applications by writing your own programs.

• **SuperPak™** — Every AST Research Multifunction Board comes with an AST SuperPak diskette containing programs for setting and accessing the clock, as well as SuperDrive™ and SuperSpool™, the most powerful RAM disk and print spooler available for PC-DOS. With SuperDrive you can use your PC's memory for simulating one to four floppy drives, from 20K to 360K each. SuperSpool allows you to set aside memory (from 4K to 512K) as a print buffer; SuperSpool sends output to the printer in the background while you execute your program in the foreground. With SuperDrive and SuperSpool, you can significantly improve your PC's operating speed.

• **Proven Compatibility** — All AST Research hardware and software products are 100% compatible with all versions of the PC and PC-XT as well as the Compaq and other PC look-alikes, and are 100% compatible with PC-DOS 1.1 and 2.0.

• **Warranty** — All AST Research products are backed with a one year limited warranty covering parts and labor with an optional paid second year warranty available.

Of course, all AST Research Multifunction Boards come with the **AST "PLUS,"** our unsurpassed reputation for quality, reliability, after-the-sale support, and overall design excellence which give our products the best price/performance ratio in the industry!



correction. Our opologies to reoders who have been trying to clear their screens since July, ond to Jomes Anderson, who did provide us with the correct listing. We flubbed it when we retyped it. Now go cleor your screens!—Ed.

Wounded Ego

My first published letter to *PC* appeared in the August issue (*PC*, Volume 2 Number 3). The very next month, you issue a plea for better letters. This is a grievous blow to my self-esteem.

Anthony Barcellos
Davis, California

Relax. You ore loved. Your August letter told us new things obout one of our ortlcle topics (fractol olgorithms for grophics). It wos one of the good letters thot whets our oppetite for more.—Ed.

The ANSI.SYS Answer Cont'd

You said to write if something in *PC* struck a nerve. Well, something did: "how to" articles that don't really explain "how to." Case in point: Kenneth Wood's article "Defining Function Keys With DOS 2.0" (*PC*, Volume 2 Number 1). Wood stated that the DOS utility ANSI.SYS could be used to redefine keys, and he gave a program example written in C. He also stated that the same could be done in any language.

The point of the article was to illustrate the use of ANSI.SYS, which Chapter 13 of the DOS 2.0 manual doesn't quite manage to explain. In "Letters To PC" (Volume 2 Number 4), Wood replies to a puzzled reader who couldn't get ANSI.SYS to work through a BASIC program that "BASIC bypasses the operating system to get its input characters." Nice of him to let us know, but how *does* one use ANSI.SYS if the only language one has is BASIC? No help from Wood.

That really frustrated me. I've been using mainframes and minis for close to 10 years to do statistical analysis, bibliographic storage and retrieval, and text processing. Text processing on these machines is a laborious affair that involves entering text and formatting commands with a text editor, then processing the file with the text processing program. I was looking for something simpler to use, something interactive, when the IBM PC came on the market.

I was ecstatic when I saw its character set, and figured someone would soon find a way to get French characters (like é, â, è, à, ù) from the keyboard to the screen to the printer. I was tired of typing "stand-in" characters that I later replaced with accent-backspace-character sequences in order to simulate French characters on mainframes.

I purchased a PC as soon as I could, in December 1981, and I have been using it as a data entry machine and smart terminal. I still use a mainframe for text processing until some suitable word processing software becomes available for the PC.

I am still waiting. Some word processing programs that work the way I would like are available in Quebec, with French characters on the keyboard and on the screen: *L'editeur PC* (a translation of *WordWond*) and a patched version of *Volkswriter*. But I need something that will process footnotes properly, deal with sub- and superscripts, and lengthy documents (30 to 50 pages) with a modest amount of memory.

DOS 2.0 seemed to be the answer to my problems. The descriptions of ANSI.SYS that I read make it sound like a snap to take a good word processor and redefine some keys to my liking. I managed to get DOS 2.0, only to be left so helpless by Chapter 13 of the manual and Wood's article that I resigned myself to plod along as I had always done in the past.

Then, late at night, after reading Wood's reply in the September letters column and remembering a phrase about standard input and output in Chapter 13 of the DOS manual, I was struck by an idea. How does one do I/O on a computer without going through BASIC? Why, with DOS, of course! So using BASIC, I created a file containing the Keyboard Key Reassignment character sequences I wanted, and then asked DOS to TYPE that file. The cursor raced down the screen, obviously typing invisible characters. I tried the reassigned keys. They worked! I created another file to restore the key assignments to their standard keyboard layout. I made up a .BAT file to convert the French characters to character sequences the mainframe text processing programs will understand.

I can now enter text on the PC with EDLIN, easily proofread what I've typed, then dump the file on the mainframe. Maybe soon I will be able to use a text processor on my PC.

José E. Igartua
Montreal, Quebec

Corrections

Okiprint, from The Software Factory, does not require a color monitor to operate properly ("New On The Market," *PC*, Volume 2 Number 5).

Zuron, from Zee Programming, does require a color monitor to work. In addition, the game's full name is *Zuron Defender* ("New On The Market," *PC*, Volume 2 Number 6).

The charts illustrating "Battle Of The Network Stars," (*PC*, Volume 2 Number 6) were incorrectly labeled. The chart on page 94 should read "File Read Time." The chart on page 95 should read "File Create Time." The tested file read time for PC Net is 350, not 35.

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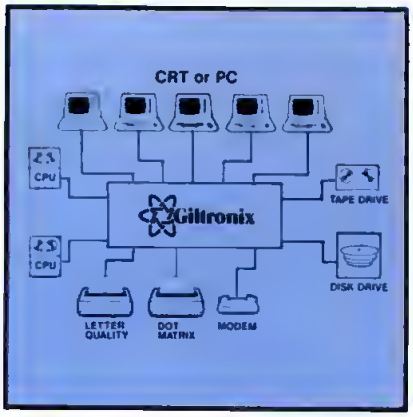

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Conscience In Computing

Illegal use of the computer is a threat to all of us. To control computer crime, we must protect our own data and teach our children to respect information power.

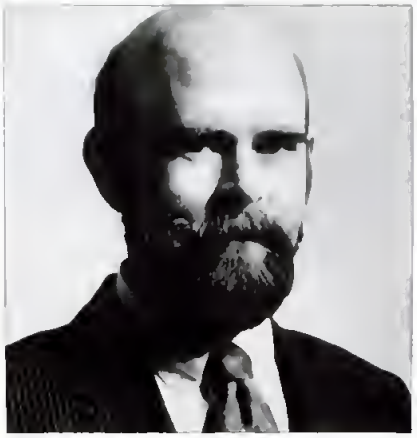
The world appears to be careening as never before toward an unknown cybernetic future. We look around and see new industries, new professions, even new forms of crime—all created or influenced by computers.

Crime demonstrates perfectly the dramatic changes in our computer-based culture. For the last 5 years, I have been studying computer crime as director of the National Center for Computer Crime Data, a clearinghouse for information and research. From that vantage, I see computer crime as a kind of useful, albeit evil, systems analysis. It quickly points out a computer system's weakest links.

The Emperor's New Clothes

Neal Patrick recently testified before a congressional subcommittee on the topic of computer security. This 17-year-old, a member of a group calling itself the 414 gang, had used a personal computer, a modem, and a less-than-earthshaking level of computer expertise to gain access to more than 60 computer systems throughout the United States and Canada. His targets included Los Alamos Nuclear Research Center, Security Pacific Bank in Los Angeles, and the Sloan-Kettering Cancer Center in New York City.

His message to the subcommittee was that anybody could gain access to computers just as he had—it wasn't hard. Security is often nonexistent, he told the assembled legislators. He pointed out the fact that users would not even spend the 30 seconds required to change a password, as their user manuals told them to do.



Jay Bloombecker

In a perverse way, we ended up grateful to this young man—he had demonstrated how naked our emperor was. We trusted those who manage our computer systems to keep them adequately protected, and it appears that some have abused our trust, including government and private agencies with files containing information about us, businesses that take their losses to computer crime out of our hides, and the military establishment, upon whose computer systems the very future of our planet depends.

We must look at the rash of computer crimes involving personal computers without paranoia or complacency and try to discern some of the more striking implications for personal computer owners who wonder how they may be affected by computer crime.

Recently, the father of a 16-year-old told me that his son would never become a file prowler. "I'd take the modem out of the house before I'd let that happen," he said. That's a hard choice, one of the many choices that parents will have to make when they bring computers into their homes. Unauthorized computer use demonstrates society's inability to communicate morality to its young. There is no conscience in computing; the field seems so new and so seductive that many adults seem happy to go on forever talking about what computers can do. There is seldom much discussion, however, about whether computers *should* do everything they *can* do.

Computer Addicts

Addiction, a term that used to be reserved for physical dependencies on substances like heroin and alcohol, has been and virtually redefined. For many people, computer addiction is a negative term. For many so-called computer addicts, it is a label worn with pride.

The central difference between a nega-

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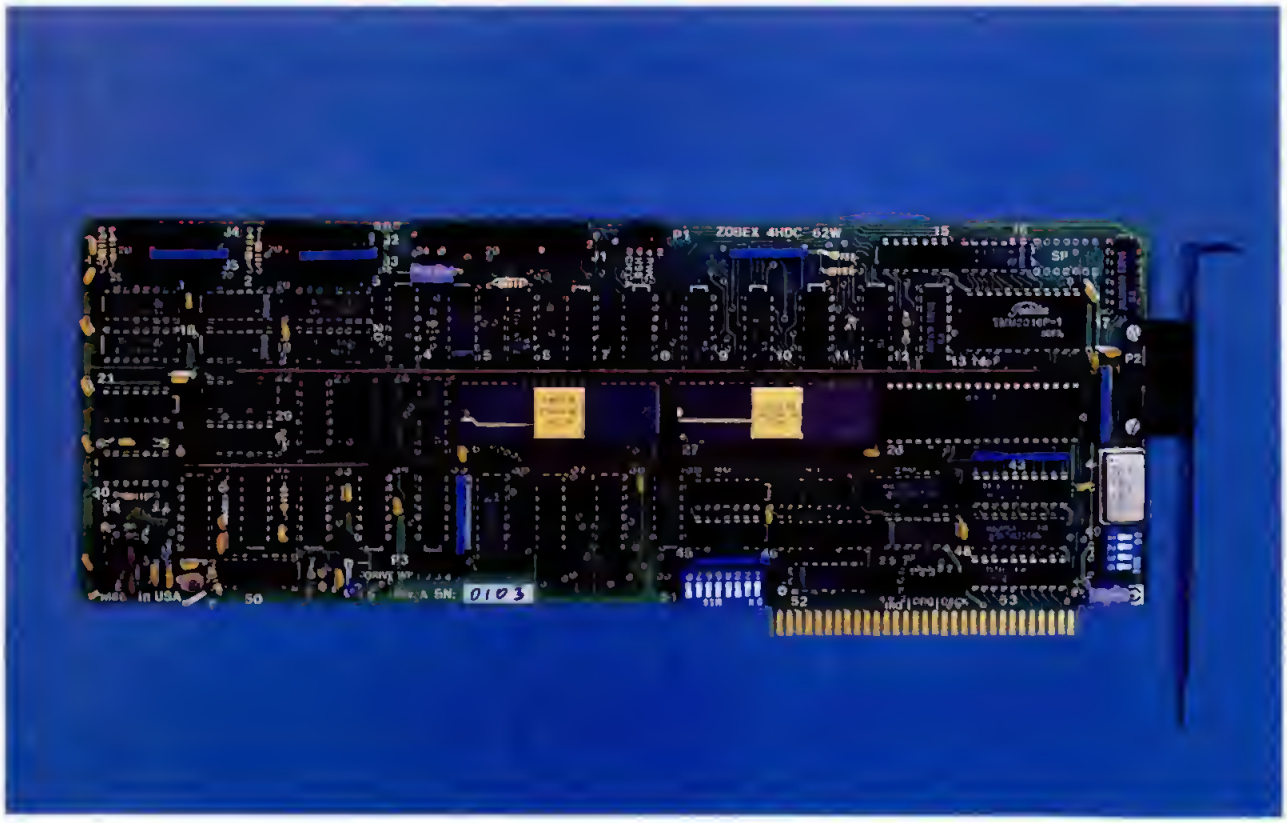

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tive and positive addiction may be the addict's connection with external reality. Perhaps a positive addiction is one that brings us closer to other people, things, and experiences. Runners, meditators, Zen Buddhists, readers, and lovers may feel out of sorts or unfulfilled without their daily dose of the activity to which they are addicted. If they use their addictions to augment their feelings rather than obliterate them, perhaps positive addiction is the appropriate phrase. If so, the question of whether computer hacking is a negative or positive addiction is probably best addressed to those most responsible for the young hacker's development.

It's up to parent and child to determine whether computer use is a negative or positive addiction. The question is essentially one of humanity and values. If you let manufacturers determine the morality of your children, you shouldn't be surprised if their concerns are limited to getting and spending. Putting conscience into computing means adding moral sense into the equation, and parents can do this more compassionately than the FBI.

It is important to remember that not all computer criminals are kids. Nor are all computer criminals after information, or even after money found in obvious targets like banks or payrolls. Consider the case of the computer criminal who traveled from state to state selling computer peripherals at phenomenal prices. With no inventory to speak of, he could afford to offer bargains. He took people's money and ran. When last we checked, he was in jail on one such case and believed to be running another scheme from inside the prison. Consider, too, the chagrin at the Security and Exchange Commission when it learned that a computer demonstration involved a blinking machine that did nothing else.

Around the world, con men and women are developing new schemes based on no other knowledge of computers than that people have lots of funny ideas about them. People who believed that computers could do investment computations and instantly produce windfall profits have been fleeced in schemes in Florida and Colorado to the tune of over $50 million. In England, a similar scam involved several hundred thousand pounds. In New York, over 500 people were conned by phony repairmen who waited at Citibank's automated teller machines and persuaded them to hand over their cards.

It is important to remember that not all computer criminals are kids.

Protect Your Assets

Both illegal access to computers and consumer computer fraud demonstrate crime's basic economic law. Criminals go where the money is—or, more properly, where the assets are. Computer users must protect their assets, or they may find themselves embarrassed and without recourse. A popular system like *dBase II* may be all you need to do a payroll, but it may also be an open invitation to a computer criminal. And with an ever-increasing proportion of the population engaged in information processing jobs, more and more people will be looking at every part of the system they work in, trying to see what is worth ripping off, from paper and blank diskettes to space and time. Another valuable commodity, of course, is information that, if changed, can make the criminal's performance look better, such as school grades or the new net worth of a company issuing new stock.

If you use a computer in business, you have concentrated and reorganized your assets, possibly creating, in the process, assets you never had before. It is essential to be aware of everything you stand to lose and how you can avoid losing it. The 414 gang showed what can be done to sophisticated systems. Entirely different problems and solutions apply to securing your own personal computer, and you ignore them at your peril.

Computer crime is an environmental issue, and environmental issues seem to need bleeding bodies before anyone pays attention to them. It may be in the interest of a computer user *not* to increase security against computer crime. It may cost less to pay insurance and to make changes in existing security after a crime occurs. One reported case involved a bank that slowly became aware that someone was using a computer to steal $5 from each account of a large number of bank depositors. The bank found it cheaper to pay the victims who complained of the loss than to make the criminal stop. If such a plan is more economical than preventive security, the chances are slight that the computer user will change the procedure—unless the public demands it. And up to now there have not been enough bleeding bodies to shock the public into demanding more moral use of computers.

In large part, this is because of the essentially peaceful uses of information processing to date. It is also because the links between computer processing and human consequences are often complex and hard to communicate. The difficulty of documenting computer abuses has kept us from gathering more information to support our position.

Taking It Seriously

People who fear computers include those who have never used them and those who study or work with them full time. Slowly but discernibly, all these people are making their voices heard. There have been bombings of computer centers in Italy, England, France, and elsewhere. Far more reasonable groups in the United States have challenged the use of computers in military weaponry and nuclear arms. But the flashpoint has not been reached, and perhaps only with the prominence of Neal Patrick and the 414 gang have we even become aware of the possibility that the public, that amorphous beast, could take computer security seriously. ■

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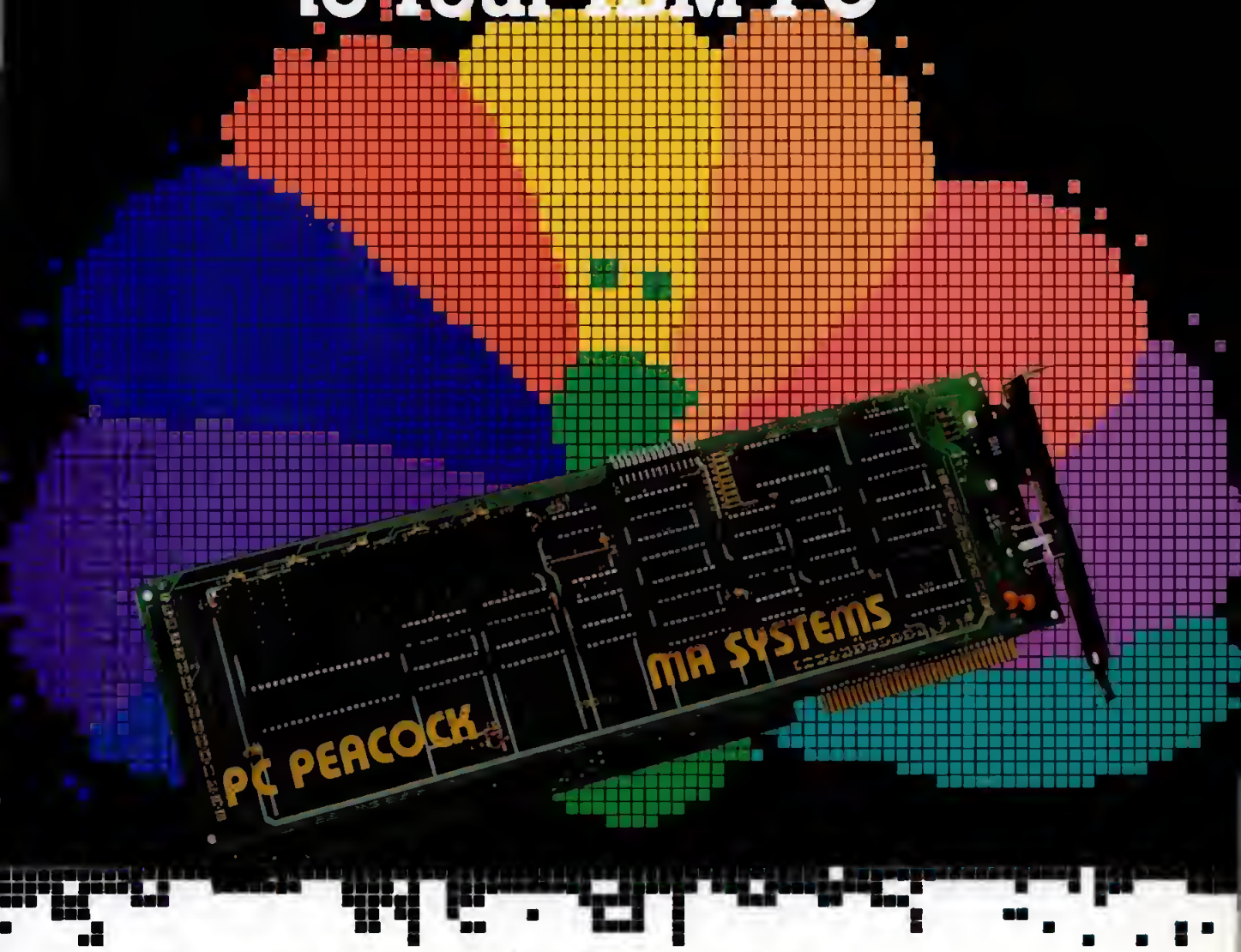

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The Two Faces of PCjr

Like the Roman god Janus, IBM's newest computer stares in two directions: to the business and work environment of its big brother, the PC, and to the home setting.

When computer manufacturers like IBM work on new projects, they give them code names for working purposes. The code name for the original IBM PC reportedly was Chess. For the new IBM PC*jr*, IBM is said to have used a few code names, including Hercules, Pancake, Pigeon, and Sprite. Bringing out a new personal computer model calls for the help of outside companies, particularly software companies such as Sierra Online, which developed many of the first games for the new PC*jr*. To find out if any of these outside companies were leaking information, IBM gave each its own code name for the new computer.

I don't know what IBM's own internal code name for this wonderful new computer was, but I know what it should have been: Janus. Janus was the two-faced Roman god who stood guard over the new year with one face turned back to the old year and the other face turned forward to the new. To me, there isn't any better symbol of the meaning and significance of the PC*jr* than Janus.

Code Name: Janus

The PC*jr* is a computer that looks in two directions. It has two strong aspects that allow it to peer with a steady gaze into two quite different realms. One face looks into the world of the IBM PC as we have known it. The other looks into the world of home computing, a world that has previously belonged to computer companies like Atari, Commodore, Mattel, Coleco, and Timex/Sinclair.

Peter Norton

The "PC" face of the PC*jr* is thoroughly remarkable. When the PC first appeared, we all understood that it was a very powerful, capable, and versatile computer at what we thought was a modest price, between $3,000 and $5,000. When the XT appeared, extending the PC's capabilities for a price between $5,000 and $7,000, we were impressed by its cost-effectiveness too. At the time, the price/performance ratio of the PC and the XT seemed quite impressive. Yet the PC*jr* is priced at around $1,000 to $1,500 while giving us about 85 percent of the computing power of the PC and roughly the same proportion of its capability as well. That is completely remarkable.

(The reason the PC*jr* has less computing power than the PC is technically intricate: In the PC and XT, the display screen has its own dedicated memory, which can be read to refresh the display independent of the needs of the processor. The PC*jr*'s display, however, shares the same memory used by the computer's processor, and refreshing the display image steals memory cycles. This causes the processor's use of the memory to take about 50 percent longer than it would otherwise, and the extra time needed to use the memory adds, on the average, about 15 percent to the overall running time of each instruction the computer carries out.)

The other face of the PC*jr* is equally impressive. Home computers have traditionally provided a strong ability to play games. In the areas of home finance, education, and home-style word processing, however, the capabilities of home computers have been sadly lacking. Analysts of the home computing world have reported that a high proportion of old-style home computers have ended up on a closet shelf, simply because they weren't really very interesting or useful after the novelty wore off. The IBM PC*jr* shouldn't suffer from this problem.

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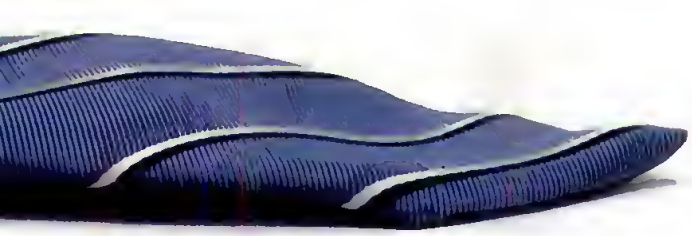

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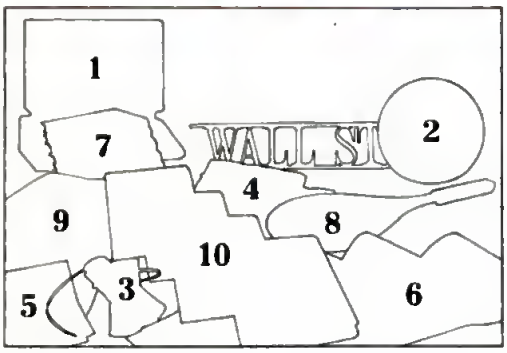

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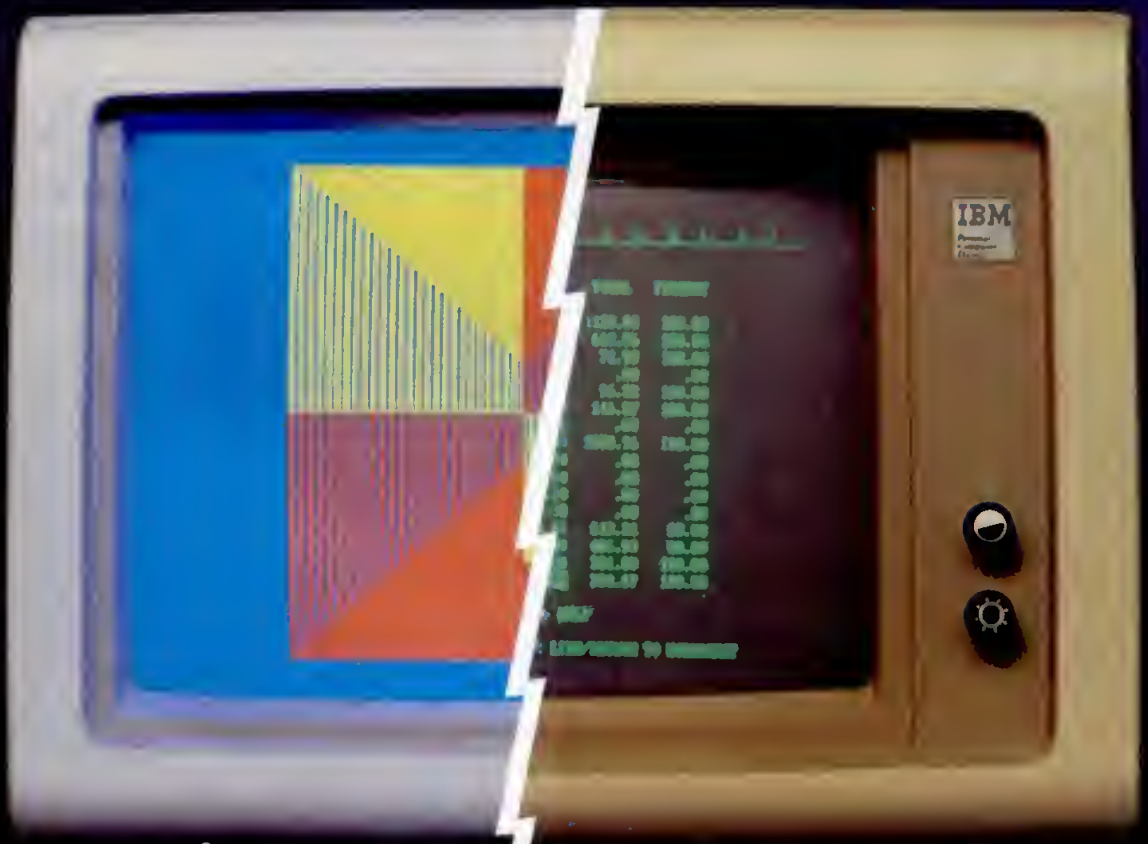

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amount of computing power and versatility into the home environment. Families that learn to make full use of the PC*jr* won't find it lacking in amazing abilities. It has enough computing power, graphic formats, and all-around flexibility to provide a dramatic improvement in home computing.

But the most important thing about the PC*jr*'s homeward-looking face is its connection to the face that looks toward the established world of the PC and XT. IBM's home game computer and IBM's cheapest personal computer are the *same* computer. This means that the computer user who works at home can run nearly all of the most important and useful programs that have been written for the other IBM personal computers.

The Volkswagen of PCs

Some practical factors need to be kept in mind when measuring the PC*jr*'s abilities against the PC's. Consider this analogy: A pickup truck can haul around more stuff than a Volkswagen. But if a person's main objective in owning a vehicle is to bring the groceries home, then a Volkswagen would serve just as well as a pickup truck could. The new PC*jr* can be compared to that Volkswagen and the PC to the pickup truck. An XT would be comparable to a moving van.

The truth is that the work most of us give our computers doesn't begin to stretch their capacity. If the work that you do with your computer really calls for an XT, you'll probably think of the new PC*jr* as nothing more than a toy. On the other hand, if you own a PC and the programs you use can get by in 88K of user memory, then the PC*jr* would probably be almost as useful to you as a PC.

The PC*jr* does have limitations when compared to the PC and XT, and two stand out: It has only one disk drive and only 128K of total memory. Most PCs have two disk drives, and an awful lot of PCs have 256K or more memory. Yet most programs for the PC have been designed to work with only one disk drive and only 64K. In the past, it may have seemed laughable that so many programs lived within these restrictions, but now we should be very grateful. Any program that followed a design guideline of 64K and one disk drive is likely to run beautifully on the PC*jr*.

IBM's new PC*jr* can be used in the office and at home.

This means that the PC*jr* will run most of the PC's programs very nicely. Most of the programs that can't run on the PC*jr* are programs you probably wouldn't think of trying on the PC*jr* anyway. If you really need a moving van, you wouldn't even think of driving a Volkswagen. If you're considering getting a PC*jr*, then a PC*jr* is probably enough computer for your needs.

Looking at things this way, the new PC*jr* has all, or nearly all, the capacity and flexibility that most of us who are already using PCs need. For someone who is just starting out in personal computing with the IBM PC*jr*, things look even better. These new users can tailor their choices of programs and applications to fit the abilities of their computer.

All in all, the PC*jr* looks like a remarkable machine for its capabilities and an astounding one for its price. The microcomputer world has looked with amazement at the impact of the original PC on personal computing, it seems likely that the PC*jr* will make an even bigger splash, and that the waves from that splash will spread much further. There is great excitement ahead. Stay tuned. ■

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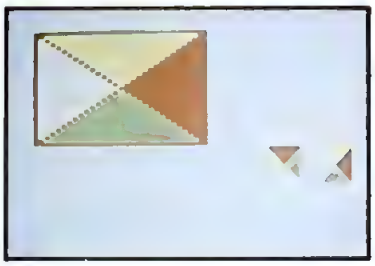

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Meet The New Members

This issue of PC Magazine explores the three latest additions to the IBM personal computer family: the XT-370 Workstation, the PCjr, and the 3270-PC.

First there was the PC.

When IBM produced its personal computer, the machine stood far apart from the rest of Big Blue's activities. It was a kind of stepchild, not unloved but not entirely in step with the rest of IBM's computing clan. Apart from building and marketing the machine, IBM did little to find it a role in the computing world. The PC's character and many of its capabilities were provided by outside vendors rather than by the computer's corporate parent.

Then IBM introduced the XT. It was as if PC had suddenly acquired a tough older brother. The introduction of this more powerful version of the IBM personal computer was an important manifestation of the company's belief that personal computers are serious machines with important business roles to fulfill. The PC-XT team could play a much larger role than the PC alone, and the addition of an "older brother" brought the PC closer to the family fold.

Now IBM has expanded the PC family even further with the introductions of the PC*jr*, the XT-370 workstation, and the 3270-PC. These new products represent the full integration of PC into the IBM scheme of things. No longer is the personal computer an odd offspring. Now, in fact, it appears as the heir apparent to the role of the IBM business workhorse machine. And the new additions to the PC family extend the impact of IBM personal computing all the way from the rec room at home to the data processing room at major corporations and institutions.

If the PC by itself represented the standard by which microcomputers were judged over the last two years, the PC family will be the standard by which integrated computer systems will be judged from now on. IBM will no longer merely be selling a good micro machine; it will be marketing a system of micros with such variable and flexible capabilities and applications that the possibilities almost defy description.

The possible combinations are mind

From left: the IBM XT-370 workstation, the PCjr, and the 3270-PC.

boggling: PC*jr*s at home or on secretaries' desks, with PCs and XTs in executive offices, laboratories, and sales stations, and 3270s at branch offices, communications posts, and overseas outlets, plus 370 workstations at key points in the processing chain of command. An individual or company can now have machines of different characteristics and power in different situations, all richly compatible with one another and which can trade information up as the information grows more complex or shift it down into smaller, easier-to-use units. Customers, if they so desire, can arrange to purchase an entire family of computers that can be serviced by one person and that require one basic set of training guidelines.

Beyond these straightforward commercial considerations, though, the new PC family is important because it is a first taste of the computing future. Today's individual, isolated, proprietary micros are destined to give way to networked machines that can speed information wherever it needs to go and can speak to one another and to other devices at different levels in the computing chain. The distinctions between micro, mini, and mainframe will continue to blur as machines become more flexible and powerful at all levels. Personal computing will shift from today's one-man, one-machine situation to a future in which the individual will be able to work through many machines, depending upon the best way to solve each problem.

By spreading IBM personal computing across the broad face of individual and business situations, the PC family is leading the way into this age of enhanced communications and capability.

In short, these machines are transforming the way we use and think about personal computers even more than the PC did on its own. That is why we at *PC Magazine* felt that the new PC family deserved special coverage. Meet the new members of the IBM clan; you'll be reading about them and using them often in the weeks ahead. ■

Photograph: Dennis Bettencourt

PETER NORTON

Screening The PC*jr*'s Color, Video, And Memory Options

Offering a choice of colors and screen memory sizes, PC*jr*'s video display screen is a rich and effective mixture of new and old technology.

Dennis Bettencourt

The most remarkable thing about IBM's new personal computer, the PC*jr*, is how it manages to be both the same as and very different from its predecessors, the PC and XT. Nowhere in this remarkable new computer is this more strikingly apparent than in the video display screen. We'll take a quick tour through what is old and new in the PC*jr's* display screen and how the two are married so effectively.

The PC*jr's* display is rich and complicated with many parts to it. It offers new graphics modes, more flexible use of color, and an intriguing new way of using memory, which played a major part in keeping down the cost. PC*jr's* new circuitry differs from the PC's, and its new video modes have an effect on its computing power. Finally, there are all those video plugs on the back of the PC*jr*. We'll take a look at all these factors and explore what they do.

Let's begin where IBM began—doing its darnedest to imitate the PC. PC*jr* is designed to act like a PC with the color graphics board installed. The original PC design had eight different video modes, one specifically for the monochrome adapter and the other seven for the color graphics adapter. Programmers familiar with the PC's built-in ROM BIOS service programs know the color graphics modes as video modes 0 through 6 and the monochrome mode as 7. A color graphics adapter could be put into any of the PC's seven modes using the BASIC statements shown in Figure 1.

Since the PC*jr* is designed to mimic an ordinary color graphics board PC as much as possible, all the original color graphics modes work as they originally did, as do the BASIC statements that control them. But in addition, there are three new graphics screen modes, with accompanying new BASIC statements to control them: SCREEN, COLOR, and PALETTE.

To the PC*jr's* innards, there are three new video modes, referred to as modes 8, 9, and 10, respectively. Each of these new modes extends the PC*jr's* graphics capability beyond what the PC's original color graphics board provided. Mode 8 gives us *low*-resolution graphics, with 160 dots, or pixels across the standard 200 lines that fill the screen from top to bottom. By contrast, the other two resolutions, which are not new, given us 320 pixels across for medium resolution, and 640 dot positions on each line for high resolution.

Mode	BASIC Statements	Description
0	SCREEN 0,0 : WIDTH 40	Text, 40 column, black and white
1	SCREEN 0,1 : WIDTH 40	Text, 40 column, color
2	SCREEN 0,0 : WIDTH 80	Text, 80 column, black and white
3	SCREEN 0,1 : WIDTH 80	Text, 80 column, color
4	SCREEN 1,1	Medium-resolution graphics, color
5	SCREEN 1,0	Medium-resolution graphics, black and white
6	SCREEN 2	High-resolution graphics, black and white
7 (The monochrome mode, not used by the color graphics adapter or the PC*jr*)		

Figure 1: *the original eight color graphics modes in BASIC.*

A Choice of Colors

In the new low-resolution mode 8, all of the PC*jr's* 16 color options can be used at once. In the original PC, only four colors could be used at a time in the graphics modes, and we couldn't even choose our own four. But now, with low-resolution mode 8, we have a free and complete choice of colors, as well as a new resolution.

You might be wondering why it is useful to have a new lower-resolution mode for creating graphics. The point isn't simply to extend the amount of color we can use, as we'll see in a moment. The real reason is to make graphics work better with TV sets. TV sets have a fairly poor picture-making resolution compared with computer monitors. They are not very good at handling pictures made up of 80 columns of text nor those that use either medium or high graphics resolution; it's for TV sets, in fact, that IBM personal computers originally were equipped with the 40 column display mode. With the higher-priced PC and XT models, TV sets were seldom used for computer display screens—after all, anyone who could afford a PC or XT could probably afford a proper monitor. But now, with the low-priced PC*jr*, TV sets will be widely used—that's why a low-resolution graphics mode is so important.

Two other new modes, 9 and 10, add more color to the existing medium and high resolutions. Mode 9 is 320-by 200-pixel medium resolution, but with full use of 16 colors, whereas the old medium resolution mode 4 used only four. Mode 10, 640-by 200-pixel high resolution, selects four colors in a palette from the full complement of 16, whereas the old high-resolution mode gave us only two colors (black and white).

We have been describing these three new graphics modes in terms of their internal ROM BIOS video mode numbers. In BASIC, they are controlled by the SCREEN statement's mode parameter. Those who have dug into PC have learned that the computer looks a little different from the perspective of BASIC, and this is also true for these new video modes. In the BASIC SCREEN statement, there are four new modes, numbered 3 through 6. SCREEN 3 mode is the new low resolution (video mode 8); SCREEN 5 mode provides the new medium resolution with more color (video mode 9); SCREEN 6 corresponds to the new high resolution with more color (video mode 10). SCREEN 4, which we skipped over, is something of an oddity—it's the old four-color, medium resolution, which we always had with SCREEN 1, but the color is controlled a bit differently.

Color, in fact, figures in the PC*jr* in ways that are quite new. For one thing, the PC*jr* has more colors than the PC. As we've seen, there are now 16 instead of four in medium resolution mode and four instead of two in high. In addition, we can now select which colors to have at our command when we are using a 4-color mode. In the original circuitry, the colors in the PC's palettes were mostly fixed; we could chose one of the four colors used in the palettes, but the other three were preselected for us. The new color graphics circuitry, on the contrary, is completely flexible: We can load any color selection that we want to into the palettes.

Arranging the Palette

To control the new color possibilities, PALETTE and PALETTE USING statements and an extended COLOR statement were added to BASIC. The function of the PALETTE statements goes beyond defining which colors will be available in the four-color modes. In the 16-color modes, the PALETTE statements can be used to rearrange the colors, so that when a program asks for color 1 (which is normally blue) it might actually get color 4 (red), and so on. Changing PALETTE can instantly change the colors on the screen or make things appear and disappear. In fact the new color tricks are so extensive and interesting that they could use a whole article to themselves just to cover the basics of what we can now do with color.

As we hinted before, the PC*jr* differs from other IBM personal computers in the way it uses memory to support the display screen. All IBM personal computers have what is called a memory-mapped display, which means that what appears on the screen is stored in the computer's memory. The central processing unit doesn't "write" information onto the screen, it changes what is stored in memory. Meanwhile, the computer's display circuitry continually reads whatever information is stored in memory, and converts it into the signals needed for the screen.

In the PC, there is a special kind of memory dedicated to the display screen's memory mapping. What makes it special? First, it is dual-ported, which means that the display circuitry and the computer's processor each has its own independent access port to the memory, so that they will not get in each other's way; both the display and the processor can be working with the dual-ported memory at the same time, without either one slowing the other down. This arrangement works very well for memory-mapped displays but is more expensive than ordinary memory. To help hold down the cost of the PC*jr*, its display memory is *not* dual ported. To keep the display and the processor from butting heads, the memory circuitry for the PC*jr* gives a certain proportion of memory access cycles to the display screen, letting the processor use the remaining cycles when it needs them. The net result is that it takes the PC*jr's* programs six clock cycles each time it uses the memory, whereas the PC and XT do the same work in four. This shared use of memory cycles slows down the PC*jr* only when it is using the memory. The PC*jr* runs more slowly than the PC, primarily because of the extra time needed to use its memory. This is a small price to pay, however, particularly since most programs don't use much of the computer's power anyway. In many circumstances, the slower running time of the PC*jr* will not be noticeable.

The new color tricks are so extensive and interesting that they could use a whole article to themselves.

Display memory in the more expensive IBM personal computers is unique for a second reason: its location in the computer's address space. The memory addresses, or address space, of IBM personal computers have a range of 1 million bytes. About two thirds of this space is set aside for our programs to use; the rest is held off for certain dedicated uses, one of which is providing a fixed location for the display memory. For those familiar with hexadecimal memory addressing, the monochrome adapter places its display memory at segment B000, and the color graphics adapter places its display memory at B800, both toward the high end. In keeping with its remarkable nature, the PC*jr* sets up its display memory in a way that is both completely different and yet also functionally the same as the PC.

How can we explain this apparent contradiction? To start with, the PC*jr* doesn't use any special memory at all—the ordinary, general-purpose RAM that is used for programs is also used for the information that appears on the display screen (which is partly why the PC*jr's* display memory can't be dual ported). Next, to provide memory for the display, a portion of the PC*jr's* memory (64 or 128K) is set aside for the display screen. Usually 16K is set aside, which is the same amount that the original color graphics adapter had. However, the amount of memory set aside can be adjusted. However much memory is given to the display, it is at the top of the computer's 64K or 128K, and the rest of the memory is used in the ordinary way. If a PC*jr* with 128K of total memory has the display set to use 16K—the normal amount—then 112K is left over. In this case, the computer will act like a PC with 112K memory.

In the PC, the display memory is located at one of two fixed locations, depending upon whether a monochrome or color graphics adapter is used. Many programs have been written that make use of this fact by placing their output directly into the computer's display memory. When IBM was designing the PC*jr*, it knew that the actual display memory would not be located at the traditional places, but elsewhere, (and at a moveable "elsewhere" at that), since the actual location of the PC*jr's* display memory

changes depending upon how much memory there is and how much is given to the display. This creates a real problem for all those programs that try to use the display memory directly—they will be looking at the wrong location when they're run on a PC*jr*.

IBM's ingenious solution to this problem is a piece of circuitry known as a video gate array or VGA. The VGA is a sort of programmable supervisor of the use of memory. It is told when the PC*jr's* actual display memory location is set. As programs run on the PC*jr*, the VGA constantly checks any references to the traditional location of the color graphics display memory, located at hex segment B800. If the VGA finds that a program, any program, is trying to use the PC's display memory locations, the VGA invisibly reroutes things to the PC*jr's* true display memory. By this sleight of hand, the VGA makes the PC*jr* act as if it were an ordinary PC with the color graphics adapter. Even though there is no memory on the PC*jr* board actually located at B800, part of the PC*jr's* regular memory is treated as though it had been moved to that location.

Adjusting the Amount of Memory

As we've mentioned, the amount of memory used by the PC*jr's* display screen can be adjusted. This statement calls for some explanation. Depending upon what display mode the computer is in, different amounts of memory are needed to store the information that appears on the screen. In the original color graphics modes, this could be as much as 16K, or as little as 2K for the 40-column text modes. Accordingly, the original color graphics adapter board was built with exactly 16K of display memory on it. When the computer was in a graphics mode that needed 16K, the screen used the entire display memory. In any of the text modes, which used less than 16K, part of the memory was used for the information currently shown on the screen, and the rest was set aside for off-screen images, called pages. BASIC gave us control over these display pages with the visual-page and active-page parameters of the SCREEN statement.

PC*jr* takes this fundamental idea and develops it further. First, its display memory, carved out of ordinary main memory, is adjustable from a low of 2K to a high of 32K (which is required for using either of the new medium- and high-resolution modes because of their extra colors). Naturally, because the PC*jr* is set up to mimic the PC, the default for the display memory size is 16K, the same as the PC's. But PC*jr* can change the size of the display memory: expand it for more pages or for the new modes, or diminish it to recover working memory space. It's particularly useful to reduce the size of the display memory, since few programs make use of multiple display pages and the PC*jr* has less memory than members of the PC community are accustomed to using. If, for example, we're running a 128K PC*jr* with DOS 2.10 with the display memory set at the default value, our programs have 88K to themselves—a good-sized amount but not huge by PC standards. If we cut the display memory down to a reasonable minimum of 4K, then our programs have 100K to work with, over 13 percent more.

The innovation means that we can connect a TV set to our PC*jr* with an ordinary audio jack connector.

The final novelty in PC*jr's* video display magic is the number of plugs on the back of the system unit. There are no fewer than three different built-in video outputs. As expected, PC*jr* gives us exactly what a color-board PC would give us—a composite video outlet and an RGB outlet. The RGB outlet is designed to connect to a computer-quality RGB monitor, providing it with separate signals for the three components of display color, red, green and blue (R, G, and B). The composite outlet is designed to connect to what is called a composite monitor, of which there are two kinds. A color composite monitor will produce all the colors that the IBM PC generates, just like a high-quality RGB monitor; the only difference being that the picture quality may not be as good as that of an RGB. A monochrome composite monitor will produce a picture similar to IBM's monochrome monitor (which can't be used with the color board, or with the new PC*jr*) and may produce a green, amber, or white display image. Many PC users have found what PC*jr* users will discover—that this kind of display screen is one of the cheapest available and one of the easiest to read when you are working with written text for programming or word processing.

RGB and composite outlets are fine for connecting our computers to special computer monitors, but these outlets can't be directly connected to an ordinary TV set. In the old days, we needed another piece of equipment, called an RF modulator, to convert the computer's composite signal into a TV-style signal. The PC*jr* has a third video outlet that provides a signal our TV sets can use directly, thanks to an RF modulator built right into the PC*jr*'s system unit. The innovation means that we can connect a TV set to our PC*jr* with an ordinary audio jack connector. This direct TB signal provides one extra benefit previously unavailable on the other models of the IBM personal computer. When we use the TV outlet, the sounds generated by the PC*jr* are included with the picture image, so that our TV sets can produce both sound and picture together.

This article is just a quick run-through of what is new and exciting about the PC*jr*'s video display. It only begins to sketch out the main points, and there is much more to learn about the amazing details inside the PC's younger sibling. ■

Cartridge Magic: PC*jr*'s New Memory

The PCjr's two cartridge slots fit neatly into the memory design of the IBM personal computer family.

Of everything that's new in the IBM PC*jr*, one of the most innovative is the software cartridge. In this article, we'll take a look at how the new cartridges of the PC*jr* work and how they fit into the overall design of IBM personal computers.

A computer's memory can be compared to a playing field where the championship teams of computer instructions we call programs perform athletic feats. Plugging a software cartridge into the computer is like putting a team onto the playing field—it's an instant way to add excitement to the sport of computing.

To appreciate the magic of software cartridges, we must understand some key things about how IBM Personal Computers use their memory, since software cartridges are a part of that memory. IBM Personal Computers, actually have two different kinds of memory. Random Access Memory (RAM) is used by the computer to hold the programs and data that it is currently working with. This kind of memory doesn't have any permanent use; it's just the playing field where different teams, or programs, can play. When the program teams are done, they leave the RAM playing field free for the next team. When we talk about our computers having 64K or 128K of memory, we're talking about how much RAM it has, measured roughly in thousands of bytes.

Understanding RAM and ROM

Anything can be stored in RAM for as long as it is needed. This information can be inspected (or read out of memory) and

changed, or written into memory. For this reason, RAM is sometimes called read/write memory. When a new program begins working, it overwrites whatever was left behind by the last program; when the computer is turned off, everything that was stored in RAM is then erased.

Computers also use ROM, which is permanently recorded with programs and data, so it is able to provide us with programs that are always ready to be used and which can't be accidentally erased or lost the way that programs on diskette can be. Giving a computer programs recorded on ROM is like building a locker room next to the playing field. ROM doesn't increase the size of RAM's general playing field, but it adds extra facilities that can enrich the use of the computer.

Each IBM Personal Computer, whether it's a PC, an XT or a PC*jr*, has two distinct sets of ROM programs built into them: one is the cassette BASIC, which we see in action when we turn on our computers without a diskette, and the other is a set of fundamental control programs, called the ROM-BIOS, which assist the operation of the computer. These ROM programs are permanently recorded on memory chips, which are permanently installed in the computer.

PCjr's two program cartridge slots.

The program cartridges that the new PC*jr* can use add an extra degree of flexibility to ROM programs. The PC*jr*'s program cartridges are permanently recorded, so users don't have to worry about erasing or damaging them. But because they aren't permanently installed, they can be switched around; one cartridge can be plugged in for one use and another cartridge for a different use.

A cartridge plugs pre-recorded memory into the PC*jr*'s memory space. To understand how that works, here's a short tutorial on how the memory is organized.

Use of memory in the IBM personal computers is based on the architectural design of the Intel 8088 microprocessor. Every computer has what is called an address space, which is the definition of all of the memory that it could have. The specific memory that the computer actually has is located within that address space. IBM Personal Computers, and all computers which use the Intel 8088 chip, have an address space of slightly over 1 million bytes—1,048,576 bytes, to be exact, or 1,024 kilobytes.

Block Number	Use
0	Ordinary RAM for our programs and data
1	Ordinary RAM for our programs and data
2	Ordinary RAM for our programs and data
3	Ordinary RAM for our programs and data
4	Ordinary RAM for our programs and data = 640 K total
5	Ordinary RAM for our programs and data
6	Ordinary RAM for our programs and data
7	Ordinary RAM for our programs and data
8	Ordinary RAM for our programs and data
9	Ordinary RAM for our programs and data
A	Reserved (mysterious)
B	Display memory, monochrome and color graphics
C	Fixed disk and mysterious reserved
D	for use by 2nd cartridge slot
E	for use by 1st cartridge slot
F	ROM - BASIC and BIOS

Figure 1: *The 16 memory blocks in an IBM PC, XT, and PC*jr*, and their functions.*

Memory Architecture

When IBM designed the PC family of computers, it had to make some basic decisions about how that memory capacity would be used. In broad terms, two thirds of the address space is dedicated to general use by RAM memory; the other third is set aside for special uses such as the PC*jr*'s new software cartridges. To understand them in more detail and to see exactly how the software cartridges fit into the scheme of things, let's take a look at the working boundaries of the memory.

The entire 1,024K memory space of our computers doesn't have any real boundaries or divisions and every part of it can be used uniformly. But just as yard lines are drawn on a football field to mark off locations, so the computer's memory is divided into 16 blocks of 64K each. This division into 64K blocks helps us talk about different parts of the address space, and it helps show some of the structure that IBM designed into their use of the computer's memory. We can identify

each of these 16 blocks of 64K each by the first hexadecimal digit of their addresses, and we can refer to them as 0 through 9 and A through F.

Figure 1 shows an outline of all 16 blocks of memory. The first ten blocks together, a total of 640K, are set aside for ordinary RAM. This is almost two-thirds of the total space. The A-block that follows the RAM area is set aside for some future use. The B-block is used for the memory that the monochrome and color-graphics adapters need. The two original PC display adapters combined use only 20K of the 64K in the B-block; the rest of the space in this block could be used for expanded display modes.

The C-block of memory is partly used by the BIOS control programs for IBM's 10-megabyte fixed disk used in the XT. This BIOS program is stored in ROM. Curiously, this small amount of BIOS programming is placed right in the middle of the 64K C-block, dividing it neatly into half.

The main ROM programs for all of the IBM Personal Computers are located in the F-block, at the high end of the computer's address space. Both the cassette ROM-BASIC and the ROM-BIOS are located in this block.

One Mystery Solved

Before the introduction of the PC*jr*, both the D- and E-blocks of 64K memory were reserved for unspecified purposes. Now we know that they were set aside for use by the PC*jr*'s software cartridges. Before the introduction of the PC*jr*, both the D and E-block of 64K of memory were reserved for unknown purposes. Now, though, we know that they were set aside for use by the PC Jr's software cartridges. Each cartridge could use any of the memory space in this 128K area. The electronic coding in the cartridge determines exactly where in memory the cartridge's data will appear. For example, the BASIC cartridge places itself at the paragraph address E800, or exactly in the middle of the E-block of memory. This leaves the remaining 96K (all of the D-block and the other half of the E-block) for any other use. By convention, single cartridges plug themselves into the E-block of memory. Second cartridges (such as a BASIC program cartridge, which works with the BASIC language cartridge), normally use the D-block. If a program wants to look for cartridges all it has to do is to search through this 128K area of memory, to see what is there.

The information stored in a cartridge simply appears or disappears from the computer's address space whenever the cartridge is plugged in or removed. A sensor switch causes the computer to reboot when we plug a cartridge in, just as if we had pressed Ctrl-Alt-Del. This allows the computer to respond to the cartridge. In the booting process for the PC*jr*, the memory locations set aside for the cartridges are checked and allowed to indicate that they want to take control when the computer begins.

Before the introduction of the PC*jr*, both the D- and E-blocks were reserved for unspecified purposes.

Cartridges can contain anything that anyone might want to put on them, from exotic programs to ready-to-use data. In practice, though, they are intended for only a handful of things. One is standalone programs, usually games, that can be run without any use of the computer's disk drive. These are the cartridge equivalents of the self-loading diskette programs used without the help of DOS or any other operating system. Normally these cartridge programs would be plugged into the first slot; if a program is too big to fit into 64K—which is unlikely—it could have a companion cartridge for the second slot.

The second kind of cartridge is designed to work as a supplement to DOS. When DOS is running and given a command—for example, DIR or FORMAT—DOS first looks for the command program inside itself, checking for internal commands such as DIR. If the command isn't found internally, DOS looks to the disk for the external commands, like FORMAT. However, between looking to the internal command table and the external disk, DOS also checks to see if the command is on a cartridge. If so, then DOS carries it out with the program on the cartridge. The most obvious example of this kind of DOS program cartridge is the BASIC cartridge. When we have DOS running with the BASIC cartridge plugged in, and we give DOS the command BASIC or BASICA, DOS will run the version of BASIC that is stored in the cartridge.

The Second Slot

The third kind of cartridge is plugged into the second slot, with the BASIC cartridge in the first slot. Stored on these cartridges are BASIC programs that need to have BASIC running at the same time. The BASIC cartridge is designed to check the second cartridge memory block and run any BASIC program it finds there. This makes it possible to have game cartridges with programs that are written in BASIC.

Each cartridge is supposed to have a standard signature, which is 2 bytes coded in hexadecimal 55 and AA. This signature appears at the beginning of each cartridge on the extra ROM-BIOS code for the IBM fixed disk—oddly enough, at the end, not the beginning, of each diskette's boot record. Although the cartridges plug into two specific addresses, at the beginning of memory blocks D and F, DOS and other parts of the computer's system programming actually check at every 2K memory boundary for this special signature.

Figure 2 gives a short BASIC program that will search all of the computer's address space for these signatures. If you have a regular PC, this program will find nothing except for the fixed disk BIOS at location C800, if you have it. But on a PC*jr*, this search program will detect any cartridges that are plugged in.

The hex 55 AA signature shows that there is a cartridge present but doesn't tell anything about its contents. We find out about the contents from some special coded information that follows the cartridge's signature. The next byte, the third byte of the cartridge's memory, gives the size of the cartridge's ROM, in units of 512 bytes. This scheme allows for a size up to 128K. A single 128K cartridge theoretically could fill the space allotted to both cartridge slots.

Self-Starters

Following the length byte is a single machine language instruction, a 3-byte-long jump, which is intended to let the cartridge perform any start-up work that it wants to do. In the design of the IBM personal computers, interrupt 18 activates the computer's built-in cassette ROM-BASIC. When the computer is started or reset without a disk ready, the start-up programs perform an interrupt 18 to turn control over to the ROM-BASIC. This was the original scheme, in any case. Now, to accommodate self-starting cartridges, the PC*jr*'s start-up routines allow a cartridge to change the controlling vector for interrupt 18 to point to some part of the cartridge's programs. This way, the computer is given a standard place to look for the beginning of a cartridge program, while the cartridge can then jump to wherever the actual working program is located. This is part of the scheme that makes self-starting cartridges work, and it's also part of what makes it possible for the BASIC cartridge to work both as a self-starting program and as a program that can work under PC-DOS. Three bytes have been set aside on the beginning of a cartridge to let the cartridge participate in the computer's start-up activity.

Following the 6 bytes at the beginning of each cartridge, there is a table that DOS uses to identify the command programs on a cartridge. There is one entry in the list for each command program that DOS can use; the end of the list is indicated by a 0 byte after the last entry. Each entry in the list has three parts: a single byte that indicates the length of the name of the command, the command's name, and a 3-byte-long jump instruction that is used to activate the program.

Even cartridges that don't have any DOS command programs on them will have an abbreviated version of this command table, just to let DOS know that there aren't any commands on those cartridges. An empty command table consists of just a single 0 byte, the byte that is used to mark the end of the table.

The BASIC cartridge reveals what DOS command lists are like. There are two entries in the table on this cartridge, for the two commands BASIC and BASICA. BASIC and BASICA, of course, are the names of the two versions of BASIC that the original PC-DOS had. In PC-DOS, these are actually two distinct versions of BASIC, but on the cartridge there is only one program that provides all the features of BASIC. To keep completely compatible with the PC, the BASIC cartridge provides both names, even though they both use the same program.

Acting Dumb

There is a third program on the BASIC cartridge, known as TERM, which allows the PC*jr* to act like a "dumb" ASCII terminal. This TERM program, however, isn't included in the cartridge's table of contents as a third entry after BASIC and BASICA. Instead, TERM is activated through BASIC as a command, even though it isn't really a part of the language.

A complete PC*jr* with this TERM program on the BASIC cartridge costs less than many ASCII terminals. We may see lots of PC*jr*s sold to mainframe computer users just to serve as ASCII terminals; to these people, the PC*jr*'s computing ability is just a benefit. We've heard that IBM didn't plan to offer this program; it was a last minute idea that Microsoft thought up when it found out that there was enough room left over in the BASIC cartridge. Ironically, this one feature may end up selling lots, and lots of PC*jr*'s. ■

```
100 ' Check for 55 AA signature
110 '
120 CLS : KEY OFF
130 PRINT "Searching for signatures" : PRINT
140 FOR I = 0 TO 511        ' check every 2 K boundary
150   SEGMENT = I * 128     ' calculate memory segment address
160   DEF SEG = SEGMENT     ' get ready to PEEK
170   IF (PEEK (0) <> &H55) OR (PEEK (1) <> &HAA) THEN GOTO 190
180   PRINT "Signature found at hex paragraph "; HEX$(SEGMENT)
190 NEXT I
200 PRINT : PRINT "Done searching"
```

Figure 2. *This BASIC program searches the computer's address space for a cartridge's signature.*

Sound Abilities: The PC*jr*

The PC*jr* has distinguished sound-making skills that will enhance the noises in game programs. Norton believes that these capabilities reflect IBM's intentions for its new machine.

The new IBM PC*jr* incorporates many new features, but at the same time it closely matches the abilities of the PC. The most dramatic improvement over the PC is its ability to create music and sounds. We'll take a look at PC*jr's* remarkable new sound features and investigate both the technical details and the practical aspects of using them.

A Game Machine

Let me raise a question before we get started. If one of the main design goals for the PC*jr* was to make it thoroughly compatible with the PC and the XT, why did IBM add new features that would set the PC*jr* apart? Why give the new machine abilities that the PC doesn't have? The answer is games. Think about this question and the answer. It is significant to the growing community of PC users because it tells us a great deal about IBM's plans for its personal computers.

I have no doubt that IBM is serious about program compatibility among all the models of the growing PC family. However, it is evident that IBM is introducing a degree of what we might call "functional product differentiation." The company is producing various models of personal computers, which are different from one another not just in price and overall capability, but also according to the type of use. The PC*jr* is clearly targeted at home users, which means that games will become one of its largest applications. The PC is a most capable computer. It has always been able to play games well, but it lacks some of the features that the most

popular game computers have. Among them are two video features—additional colors and "sprites," which are parts of the screen picture that can be moved around quickly through hardware rather than software control. In addition, it lacked rich sounds. But, with the PC's high computing power, there isn't as much need for sprite hardware. The new video features enable the PC*jr* to make better use of color, though, in fact, it has more basic colors than the PC. One area where the PC falls completely short is in its capacity for sound variation, which is insufficient for most games. The PC*jr*, however, has distinguished sound-making skills.

But what about compatibility? Do the PC*jr's* sound capabilities sabotage the need for program compatibility among all the IBM Personal Computer models? Of course the PC and XT can't utilize the sound and video features programmed into a PC*jr* game, unless they are equipped with the necessary add-ons. However, most of the PC*jr's* new features, particularly the ones for sound, are oriented toward games, but, for the most part, XT users are not heavy game players. Worrying that certain game programs can't be run on an XT is like fretting because we can't put the XT's 10-megabyte fixed disk on our PC*jrs*. Some people may want to, but doing so is contrary to the very nature of each computer.

Entertainment and educational software programs need extra sound capability because we interact with them in a way that is more complex than interacting with word processors and spreadsheets. Games generate action sounds from chest pounding gorillas to exploding bombs. These programs play music in chords, sounding more than one note at a time, and, with the PC*jr's* new sound hardware, all of this is possible.

Technicalities

Now let's get down to the technical details. The PC*jr* retains all the PC's sound-making abilities, and adds some entirely new ones. While the new features for the display screen are natural extensions of the PC's abilities in this area, the sound-making abilities are accomplished through an entirely new means.

The sounds we hear are actually waves of pressure in the air. The frequency at which they oscillate determines the pitch of the sound, and the strength of the waves determines the volume. A computer creates sounds by generating electrical pulses at the correct frequency and strength to enable a speaker to produce the sound desired. In the PC's sound-producing scheme, the computer's clock pulse and a programmable counter were combined to generate the required frequency. Here is how it works.

The PC*jr* retains all the PC's sound-making abilities and adds some entirely new ones.

Both old and new sound in the PC*jr* begin with a frequency of 1,193,180 cycles per second, or 1.19 Mhz (million cycles per second). For the PC's sounds, this frequency is fed into a programmable counter, known to electronics designers as an 8253-5 timer chip. Our programs, written in BASIC or any other programming language, "program" the 8253 timer chip by passing it a counting number—let's say the number 2280. The 8253 timer counts the 1.19-Mhz signals being fed into it, until they reach the count value. Then the 8253 sends out a single pulse and begins counting again. In effect, the 8253 chip divides the 1.19-Mhz signal by the count that it has been given. So, if we give the 8253 chip a count of 2280, it divides the 1.19-Mhz signal into 523 cycles per second, which is the pitch of the musical note middle C. After it is amplified to the right voltage level, the 8253 chip passes the signal onto the computer's built-in speaker.

When this signal is passed to the speaker, it produces a sound with the same frequency as 1.19 million divided by the number given to programmable counter. Nearly any sound frequency can be produced this way, within the limits of arithmetic. A divisor of 60 would give a frequency of 19,886 cycles per second, while a divisor of 59 would give a frequency of 20,223. But, we couldn't achieve any frequency in between (say, by dividing by 59.5). However, in practice, this isn't a limitation; we can produce nearly any frequency that human ears can hear.

While this scheme can produce a pure musical tone at nearly any pitch, it has quite a few limitations. For one thing, only one sound can be produced at a time. Furthermore, it doesn't provide any control over volume, and it produces only pure musical pitches, not the kind of noises needed for rocket liftoffs and bomb explosions.

PC*jr's* Four Voices

The PC*jr* overcomes these limitations. While it follows the same basic approach, it adds the power of a circuit chip: the Texas Instruments SN76489A sound generator (henceforth TI). The TI sound generator provides the PC*jr* with many additional features. It can produce four different sounds simultaneously with what we call "four voices." Three of the four voices produce pure tones, like the PC, while the fourth produces noise sounds. Each of the four voices has its own independent volume control, which is called "attenuation." And finally, the noise voice can produce two quite different types of sounds.

Here's how PC*jr's* four voices work. Each of the three ordinary voices of the TI sound generator accepts a number, which controls the frequency of the sound that is generated. The sound generator starts out with the computer's 1.19-Mhz frequency, divides it by 32, and then divides it again with the controlling count that a program has assigned to any of the three voices, which results in the sound frequency that

the voice will produce. For example, if we gave a controlling count of 100, the frequency produced would be 1,193,180 divided by 32 and divided again by our 100 count, giving us a pitch of 373 cycles per second, roughly a G flat note.

Each voice takes its own count and produces its own sound frequency. The controlling counts are binary numbers 10 bits long, so they can range from 1 up to 1,023. This provides a range of sound frequencies from a high of 37,287 cycles (with a divisor count of 1) to a low of 36 cycles (with a divisor of 1,023), which is roughly the range that the human ear can hear.

While the TI sound generator's three ordinary voices produce pure tones following the arithmetic we've outlined, the fourth noise voice works entirely differently. It produces a scrambled pattern of electrical pulses, using what is called a shift register with an XOR feedback network to produce an irregular series of electrical pulses, which we hear as a noise sound. The noise voice can produce an even pattern, which we'll hear as a pure "white" noise, or a periodically varying pattern, which causes a more ragged sound. Each noise pattern has particular uses in game programs. The noise voice needs a base frequency from which to build its scrambled sound pattern, but, unlike the other three voices, this voice doesn't have its own full range of frequencies. Instead, we are given four choices—either use one of three fixed frequencies or borrow the frequency being generated by the third of the three pure tone voices. The three fixed frequencies are 2,330 cycles (a high-pitched even hissing sound), 1,165 cycles (a medium hiss), and 582 cycles (a lower, rougher hiss). If we don't need all three of the other voices for pure tones, then we can base our noise on any frequency we choose, which greatly extends the range of noises that we can produce.

Volume Control

Each of the four voices in the TI sound generator has its own independent volume control, known as attenuation. While the noise voice doesn't have its own full frequency range, it does have its own separate volume range, just as the other three voices do. The volume is controlled by four attenuation bits, each of which reduces the level of the sound by a fixed proportion, measured in decibels (dB). Each successive bit deadens the sound by about half as much as the bit before, so that the bits can be combined to produce a fairly even range of sound levels. The bits are referred to in the TI generator as A0 through A3, and here is the measurement in decibels of how much each of them reduces the sound level:

```
A0   2 dB (least attenuation)
A1   4 dB
A2   7 dB
A3  15.5 dB (most attenuation)
```

By combining the bits, we can achieve different levels of attenuation; for example, if A1 and A2 were set, the sound would be attenuated 4 dB plus 7 dB, for a total of 11 dB. If all four bits were set, the sound would shut off completely. With four bits, there are 16 combinations, giving 15 distinct sound levels, and no sound at all.

The noise voice can produce a periodically varying pattern, which causes a more ragged sound.

So far we've discussed the two ways that the PC*jr* can create sounds—from the original clock-counter combination and from the new TI sound chip. The PC*jr* is also capable of using these sounds in two ways. The PC and XT can use only the frequencies they create to produce actual sounds on the speaker built into the computer's system unit. The PC*jr* has this internal speaker, too, but, in addition, it can pass its sound signals to other electronic equipment. Among the many plug sockets on the back of the PC*jr's* system unit are two that can be used for sound.

One is an ordinary audio jack, which can be connected to a hi-fi set. Plugging it into a hi-fi results in a high-quality reproduction of the sound signals created by PC*jr*. As you probably know, the speaker built into PC and XT isn't designed for high fidelity—it was designed to produce sounds crudely and inexpensively. But now, with the PC*jr*, we can pass the computer's sound signals on to a decent sound system to achieve top-quality sound.

The other destination for the PC*jr's* sound signal is the video TV outlet on the back of the PC*jr's* system unit. This outlet is designed to connect directly to a TV set, and it provides the computers display image, already converted into the format needed by a TV set. This TV outlet is something new to IBM personal computers; the PC and XT models, provided they are equipped with a color-graphics adapter board, can be connected to a TV. But the connection is not direct; the signal must be converted by another piece of equipment called an RF modulator. One of the PC*jr's* features is a built-in RF modulator, so that we can connect it to a TV without fuss. Since the PC*jr* was set up to create a TV-type signal for its picture, it's only natural to include the computer's sound signals, too. After all, TV sets give us sound as well as pictures.

Here's a quick summary of PC*jr's* sound features. It can create sounds in two ways—either the same way the PC does or through its new TI sound generator. The PC*jr* can also use these sound signals two ways—either passing them to its internal speaker, like the PC, or sending them to external parts. The external signal is available either as part of the TV signal or independently in a signal connected to a hi-fi set. With the TI sound generator, we can create three independent pure tones and a noise sound. For each of the three pure voices and the noise voice, we can control the volume.

All these new sound capabilities require programming support, and, once again, BASIC comes through for us.

BASIC Support

Some programming language critics, myself included, like to throw bricks at BASIC, but when it comes to providing support for the features built into IBM personal computers, it compares to none. Let's take a short tour through the new BASIC commands that support these sound features.

The question of where sounds come from and where they go to is a good place to begin. The BEEP and SOUND statements control these functions. Figuring out what does what can be confusing, and the BASIC manual isn't completely clear, either. Here's how it works. First, there are four new statements:

```
SOUND ON    and    SOUND OFF
BEEP  ON    and    BEEP  OFF
```

If sound is on, then the new TI sound generator is active; when sound is off, then the old sound-generating circuitry does the job. This very simply takes care of where sounds come from—SOUND ON, new method; SOUND OFF, old method. But the explanation of where sound goes to is more complicated.

The sound signals can go to the internal speaker, to the external plugs, or to both—three combinations. (It cannot be turned off so that it doesn't go to either place.) Various combinations of BEEP and SOUND statements determine which one of these three possibilities is taking place. Figure 1 shows how the four combinations of BEEP and SOUND statements and ON and OFF statements control what's happening.

If you study Figure 1, you'll understand how it works. When the TI sound generator is working (SOUND ON), then the computer's internal speaker is turned off—because the internal speaker and its circuitry can't handle the TI generator's sound signals. So the SOUND ON statement, which activates the sound generator, always sets the internal speaker off and the external connection on. Then, BEEP ON also turns on the external connection, if it isn't already on, and BEEP OFF turns it off, unless SOUND ON is also turning it on—a little too complicated, but that's the way that it works.

Unless otherwise informed, BASIC will use the default settings, BEEP ON and SOUND OFF. The sounds come from the original sound circuitry the PC uses, while the sounds go out everywhere.

> With the PC*jr*, we can pass the computer's sound signals on to a decent system to achieve top-quality sound.

To make use of the three pure-toned voices and the volume controls, both the regular SOUND statement and the PLAY statement have been extended. For the SOUND statement, the two original parameters of frequency and duration continue to be used, and two new parameters are added: volume and voice. The volume parameter controls the loudness. Volume is set with a number from 0 to 15; 0 is silent; 15 is full volume; the numbers in between set various attenuation levels. If you are familiar with binary arithmetic, you'll recognize that the inverse of the BASIC volume value gives us the bit settings for the TI sound generator's four attenuation bits, A0 to A3.

The new voice parameter of the SOUND statement controls which of the pure tones voice will be used. The voices are numbered 0, 1, and 2, respectively. The last voice, number 2, is the one whose frequency can be borrowed by the noise voice. If we set a SOUND frequency for voice 2 with a volume of 0, then this voice will be silent. But it still will generate a frequency ready for the noise voice to use.

The PLAY statement has also been extended to use the new features, but in a different way. While it takes a separate SOUND statement to activate each of the three voices, a single PLAY statement can control any or all of the voices. The new version of PLAY will take three separate music definition strings, one for each voice. If a string is left off, then that voice isn't affected by the PLAY statement. For example, a statement like this:

```
PLAY , NOTES.1.$, NOTES.2.$
```

would skip voice zero and use the other two voices.

To let the PLAY statement control the volume of the music that it is playing, an additional command letter has been added to the music definition language, V, which sets the volume level between 0 and 15 in the same way that the SOUND statement sets the volume. The default volume level is 8, so we can increase or decrease the volume from the default setting.

The noise voice in the TI sound generator has quite special abilities and so BASIC handles it with a special NOISE statement. The NOISE statement looks like this:

```
NOISE source, volume,
duration
```

The duration parameter is the usual count of clock ticks, which is familiar to anyone who has used the SOUND statement with the PC. The volume is the new, but now also familiar value from 0 through 15, with the higher number creating the loudest noise. The source parameter controls what kind of noise sound is made. The source is a number from 0 through 7, and it works in a way that is similar to BASIC's color numbers, actually controlling more than one thing at the same time.

The NOISE source number determines the base frequency of the noise. And it also controls whether the noise will be "white" or periodic. Figure 2 shows how this works.

BEEP	SOUND	TI Active?	Speaker	Connections	Comment
OFF	OFF	No	Yes	No	
OFF	ON	Yes	No	Yes	
ON	OFF	No	Yes	Yes	default setting
ON	ON	Yes	No	Yes	

Figure 1: *BEEP and SOUND control in PCjr's BASIC.*

PERIODIC Noise	WHITE Noise	Frequency used for the noise
0	4	2330 cycles (high)
1	5	1165 cycles (medium)
2	6	582 cycles (low)
3	7	Borrowed from voice number 2

Figure 2: *PCjr's BASIC's NOISE statement controls base frequency.*

There is, of course, quite a bit more information to explore about how BASIC controls the PC*jr's* new sound abilities and the kinds of sounds they can produce. The possibilities are so great that I'm sure that we'll be trying new combinations for a long time and making some remarkable discoveries. Just to give you a taste of what's in store, let's consider these few examples.

- If we want our computer to play music like an ensemble of two or three instruments, we can use the PLAY statement to start playing three quite distinct music strings, each of which has the part for one of the instruments.
- If we want to make our personal computer play music to sound like a single instrument that plays chords, we can set up three music strings that have an identical time pattern, with the same tempo and duration of notes and rests, but with the differently pitched notes that we need to create our chords.
- We can have our computer play a "round" such as "Row, Row, Row Your Boat," by setting up one music string, shifting and copying it into two other strings, using the MID$ statement, and then PLAYing the same music in three rotated parts.
- And finally, one of the most bizarre things we can do with the sound features is to have the PLAY statement silently create various frequencies in voice number 2, by using MB (music in the background) and V0 (zero volume, silent) in the music string. Then, we can use the NOISE statement to borrow the frequencies from voice 2, which will allow it to create varying noises. Here is an example of how we could do this.

```
10 SOUND ON
20 PLAY "", "", "MB;V0;L1;
ABCDEFGFEDCBABCDEFGFEDCBA"
30 NOISE 3,8,400
```

If these new sound possibilities excite you, get your hands on a PC*jr*, plug in the BASIC cartridge, connect it to a hi-fi or TV set, and have fun. ■

Coming Soon: Games For The PC*jr*

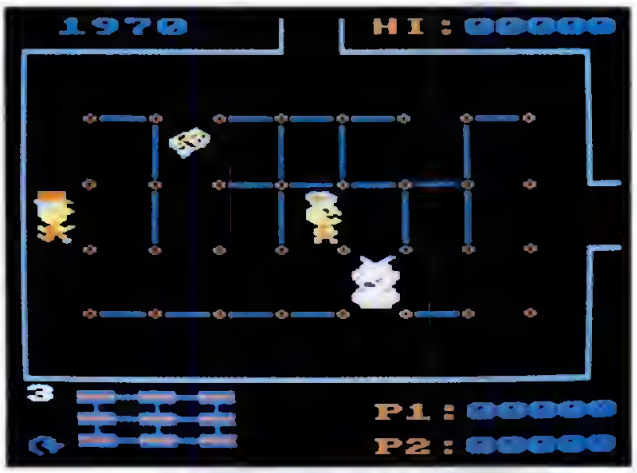
Software developers of computer games are converting their existing products or developing new ones for the IBM PCjr.

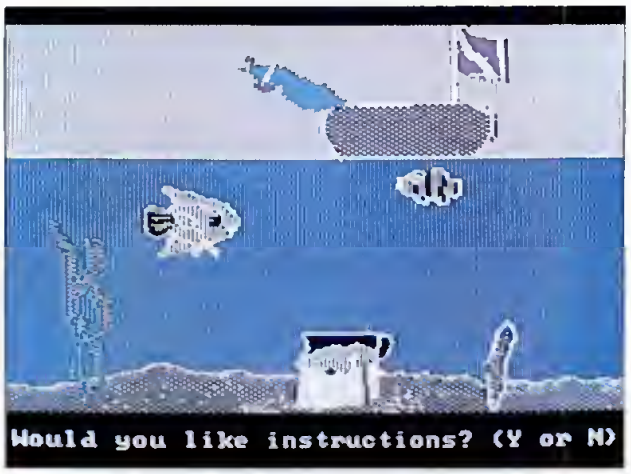
When IBM debuted its two new PC*jr* models, it quickly became obvious that the computer games industry had been eavesdropping. Most of the major software developers of games acknowledged that they are hard at work converting their games to the new format or creating new ones with exciting graphics. Other software houses are waiting to get their hands on a development machine.

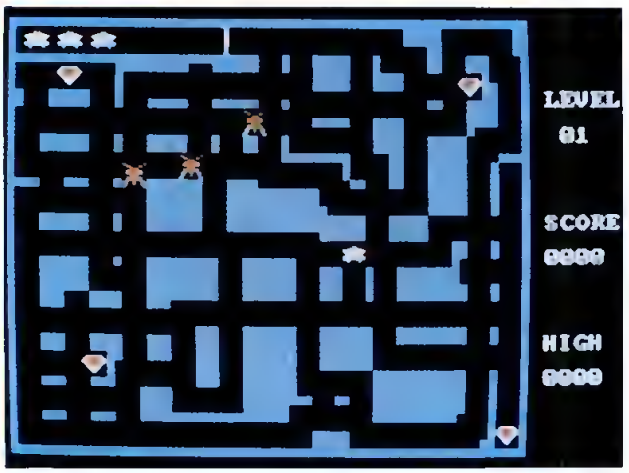
Indeed, four well-known California game design firms—Sierra On-Line, Gebelli Software, Microsoft, and The Learning Company—had been contacted in advance by IBM to create an initial line of game products for the PC*jr*. All were represented by finished products at the November 1 PC*jr* announcement.

Sierra On-Line developed *Adventure in Serenia*, a disk package for the PC*jr* that was not on display, and two ROM cartridges, *Crossfire* and *Mine Shaft*, both of which are available for other computers. (Sierra is one of the largest publishers of home computer software.) *Crossfire* is a captivating arcade-style shoot-'em-up, in which the player moves a character about a grid of alleyways in four directions, shooting at anything that moves. This game is one of the popular, best-known titles from Sierra. *Mine Shaft* is a version of *Creepy Corridors*—a game in which your computer draws mazes with diamonds in the four corners. Once you make your way to all four, a doorway to the next maze appears.

We're going to back the PC*jr* with software as we have backed the PC," said Ken Williams, president of Sierra On-Line. "We think it's an important machine that will do much for the industry







Screens depicting four different games now available for the PCjr.

in general, and we'll be converting most of our games line to the PC*jr* format."

Roberta Williams, wife of Ken and designer of many high-resolution text adventures for Sierra On-Line (among them *The Wizard* and *The Princess*, *Time Zone*, and *The Dark Crystal*), has just finished working on an original game designed specifically for the PC*jr* called *King's Quest*. It's an adventure game along the same line as her others, but it features something brand new to computer games—animation.

"I'd always wanted to do an animated adventure game," says Roberta, "but the game I foresaw couldn't be written for an existing home computer. I was happy to discover that the PC*jr* has animation capabilities."

It's almost impossible to use animation of high-resolution graphics with the artificial colors used with other computers, according to Roberta. But with solid colors, you can create beautiful animation. The PC*jr* has 16 solid colors available to the game designer. And the 128K model has enough memory to handle an animated adventure such as *King's Quest*.

Gebelli Software, founded by Nasir Gebelli, has been a driving force in the Apple game software arena. Two of his games, *Mouser* and *ScubaVenture*, have already been written in cartridge form and were on display at the IBM announcement. *Mouser* is a connecting series of nine rooms through which mice and a cat run rampant. The player's task is to position the movable maze walls to trap all the mice. Color graphics and sound effects are nicely used, and the game will probably appeal most to younger players. The same is true of *ScubaVenture*, a game in which

Photographs: Dennis Bettencourt

Developing PC*jr* Software

The PC*jr* opens doors for software developers and users but doesn't create any real problems.

What does the introduction of the new IBM PC*jr* mean to all the software developers who have been busily writing programs for its predecessors, the PC and XT?

The news for developers and users of PC software is good. The PC*jr* opens some new doors but it doesn't create any real problems for software developers or users. Existing PC software doesn't need to be redesigned or rewritten.

Because the PC*jr* is nearly 100 percent software compatible with the original PC and XT models, we don't need a new set of programs to make the PC*jr* sing and dance. We don't even need any special revisions to adapt existing programs to the PC*jr*.

No Cheating

Software developers can rest assured that their programs will work as well on the PC*jr* as they do on the PC and XT. However, they must understand the PC*jr*'s basic limitations and promise not to cheat. Of the basic limitations that software developers need to keep in mind, the most obvious are the single drive and the 128K memory.

There are two important issues concerning the disk drive. First, the PC*jr* computers will have only one. Even when industry's magicians give us ways to add on more drives, most of us will have only the standard one. The obvious lesson here is that programs for the PC*jr* must require only one drive. Relatively few PCs have only one drive (unless, like the XT, they also have a hard disk), and some program developers have become sloppy about supporting one-drive systems. The PC*jr* provides the motivation to create programs that will run with one drive.

Second, the PC*jr* disk drive is controlled and operated quite differently, with BIOS programs doing much of the diskette control work that the PC and XT's disk drive adapter does with hardware. The exact performance of the disk drive and the load that it puts on the computer's computing power are very different. Many copy-protection schemes rely on close and exacting knowledge of how the diskettes work, so problems in this area are likely to arise.

The most popular model of the PC*jr* has 128K memory, and for many programs that sounds like plenty. But programmers who are developing software for the PC*jr* shouldn't assume that 128K in a PC*jr* is the same as 128K in a PC. The PC*jr*'s display memory needs are taken out of the main RAM. (The PC and XT have dedicated display memory that isn't a part of ordinary RAM.) In most circumstances, this means that a 128K PC*jr* has 16K taken out for display use. (The amount of memory used by the display can be adjusted up or down, but 16K is normal.) When figuring how much memory is available for a program to use, we also have to take DOS into account. The PC-DOS 1.1 version use up about 12K of memory, and DOS 2.0 takes up twice that much. Fortunately, the PC*jr*'s DOS 2.10 doesn't need any more than DOS 2.0.

We find that a 128K PC*jr* has 88K of user memory for our programs and their data. This sets a new standard, or design point, for programs. A program that barely fits into 128K on a PC will probably not work on a PC*jr*, but any 128K program that has spare room should run without difficulty on the PC*jr*.

And Bear In Mind

There are also some minor things that software developers need to be aware of. The PC*jr* acts like a PC with a color-graphics display adapter, but it doesn't even try to imitate the PC's monochrome adapter. So a program that requires a monochrome adapter—if there are any—is useless on the PC*jr*.

There are also lots of niggling technical details that might keep PC programs from working on the PC*jr*. Programs that break the unwritten rules for PC compatibility by trying to outsmart the PC's BIOS control programs are likely to fail on the PC*jr*. Few PC programmers have written programs this way, but those who have may now regret it.

The PC*jr* opens one significant door for software developers: that of software cartridges. Since the PC*jr* has slots for two program cartridges, program developers can now consider either developing new cartridge programs or adapting existing diskette-based programs for the cartridge. This creates exciting new possibilities for bringing software to the PC*jr*—and also to the PC, when IBM or another manufacturer gives us a cartridge adapter for PCs and XTs. Cartridges are the main thing that sets the PC*jr* apart from the rest of the IBM Personal Computer family. The more integrated and compatible the family is, the better off we all are.

—PETER NORTON

the player moves against a scrolling screen and attempts to pick up treasures while avoiding nasty sea creatures.

Another program available for the PC*jr* is Microsoft's *Adventure*, which comes on a disk, not cartridge. However, it was not on display. More PC*jr* software is expected from this company. And though *Bumble Plot* and *Juggles Butterfly* (both on disk) from The Learning Company, were also completed they were not displayed at the product demonstration, either. The Learning Company, publishers of the highly acclaimed Apple product *Rocky's Boots*, has concentrated on software for the young user. Most of its programs are aimed toward an educational goal. Most strive for computer literacy, achieved through a fun activity. For example, *Bumble Plot* is a series of six games that use an animated creature, *Bumble*, to teach children ranging in age from 6 to 10, how to draw computer pictures. It also illustrates the concepts of greater than and less than. *Juggles Butterfly* is for the very young, ages 3 to 6. It uses colorful clowns to teach children spatial relationships and to develop simple math skills.

Other software developers are looking toward the PC*jr*, too. When I spoke to Mike Cullum, director of software development for Avalon Hill Microcomputer Games, he said he was "sitting here now trying to decide how much of our software is compatible with the new machine." According to Cullum, the company (which has published 2 dozen war games for the computer) plans to release a number of games for the PC*jr*. Among them are *Diplomacy*, the classic world power struggle, *TAC*, a game of tactical armored combat during World War II, *Panzers East*, the invasion of Russia, *Gulf Strike*, a simulation of a modern Persian Gulf war, and *Exercise Rhine*, a naval action game of close tactical warfare based in the North Atlantic during World War II. Most of these games are already available from Avalon Hill for the PC, Apple, and Atari computers. "These are the games that will definitely be available for the PC*jr* during the first half of 1984, and we're working on more," said Cullum.

"The company does not view the conversion as a big deal. Special graphics options are available in the new DOS 2.10 that are not available in DOS 1.1, which is what Avalon Hill's existing PC software uses. "So it will only enhance the games," said Cullum. "And the only reason we haven't gone to DOS 2.0 yet is because of all the users with DOS 1.1. We try to make our games as compatible as possible with the largest group of users," he continued.

Creature Creator is a program that lets you make a strange creature and then teach it to dance.

Broderbund software, another big name for Apple, Atari, and Commodore computers, currently has no public plans for the PC*jr*. However, the company's director of marketing, Cathy Carlston, said, "The company will develop some PC*jr* products in 1984." In all likelihood, we can expect conversions of Broderbund's top hits such as *Lode Runner*, *Choplifter*, *Serpentine*, and *David's Midnight Magic*. Carlston hinted that we might see an original title or two for the PC*jr* specifically. Broderbund's PC*jr* software will probably first be published on disk, which is standard operating procedure for this company.

Spinnaker Software

Spinnaker Software, the largest publisher of computer learning games in the world, also has plans for the PC*jr*. Initially it will publish *Facemaker*, a drawing composition program, *Fraction Fever*, a fast-paced action game in which the player must match correct fractions and zap incorrect ones, and *Kindercomp*, a series of games based on drawing, matching shapes and letters, writing words and names, and filling in missing numbers—all in time for the arrival of the PC*jr* in the stores. The plan at Spinnaker is to support the PC*jr* with the company's entire line of children's learning software, including the highly acclaimed detective games *Snooper Troops I* and *Snooper Troops II*. Currently, Spinnaker's products are available for Apple, Atari, IBM PC, and Commodore 64 home computers.

DesignWare creates learning programs for ages 4 through adult for the Atari, Apple, and IBM PC and plans to convert its entire line of seven games for the PC*jr*. *Math Maze*, *Spellakazam*, *Spellagraph*, *Trap-A-Zoid*, and *Spellicopter* are all journeys into word and number play. *Crypto Cube* is a three-dimensional word game with a built-in puzzle generator that allows you to create your own games. And *Creature Creator* is just what it sounds like—a program that lets you make a strange creature and then teach it to dance.

Epyx, a large publisher of computer games for Atari, Apple, IBM, Commodore, and Radio Shack computers, also plans to convert most of its successful products to the PC*jr* format in 1984, but the company hasn't made any announcements yet. However, since much of Epyx's software includes fantasy role playing and adventure games, you can expect similar programs for the PC*jr*.

Human Engineered Software and CBS Software, both with extensive lists of software titles, have carefully sectioned their product lines into about 30 percent entertainment, 30 percent home business, 30 percent productivity software, and some utilities, which means that although both companies plan to support the PC*jr* with the same enthusiasm they have shown for the PC, neither will offer many games.

The PC*jr* is a relatively inexpensive machine with plenty of memory and graphics capabilities. Only time will tell more about this new machine. What is certain, however, even at this early stage, is that the PC*jr*, if nothing else, might be the best game machine ever designed. ■

BILL MACHRONE

The Mainframe Marketplace: XT/370 And 3270 PC

IBM's dramatic new mainframe products legitimize the Personal Computer. They cry out for creative software development, pricing, and distribution in a market unlike any seen before.

Photograph: Dennis Bettencourt

History will mark the end of 1983 as a watershed time for the computer industry. Texas Instruments abandoned the home market. Osborne Computers folded its tent. DEC and other manufacturers had severe earnings setbacks. And IBM went into the workstation market. It is not surprising that IBM began manufacturing workstations. That portion of the market has been on the upswing for a while. Many workstations are based on UNIX, which is where workstations got their start.

What constitutes a workstation? While some manufacturers use different definitions, it is for our purposes a terminal with enough intelligence to execute the same programs as the host computer to which it is connected. It may emulate the host so that it seems to be using the host machine's operating system, even though the workstation's control program or local operating system may be quite different.

Another approach is to run a processor-independent operating system, such as UNIX, on both the host and workstation. UNIX is inherently a multitasking operating system, so the main difference between the host and workstation is processing power and the amount of disk storage.

Other workstations may provide additional facilities not available on the host system. The facilities can vary greatly, depending on the user's needs. Some of the add-ons include high-resolution graphics, color, interface to laboratory instrumentation, and execution or emulation of nonhost operating systems.

Some of the most popular workstations within the UNIX world are those produced by Sun Workstation and Charles River Data Systems. Western Electric is entering the fray with workstations derived from Bell Labs Interactive Terminal (BLIT). All provide a full Unix operating environment, local data storage, host communications, and high-resolution graphics.

In many ways the 3270 PC and XT/370, the new high-end PCs that IBM announced in October, are significantly less capable than these workstations. The XT/370 can only perform one task at a time. Although it provides the full capabilities of a PC-XT, it can't do so concurrently with 370 operation; 370 tasks are limited to those that can be performed as a single task under VM/CMS. The 3270 PC, while offering one of the finest color displays available, does not provide graphics.

Who will buy the 3270 PC? Anyone who is a potential customer for a 3270-compatible terminal. The multi-session capability alone is a significant aid to programmers.

Why, then, all the fuss?

It's altogether too easy to say that the main reason these machines will sell is the three magic letters on the front. There's much more to it than that.

First, both products at last legitimize IBM's bastard offspring, the PC. Sources within IBM report that the micro-370 chip set was in design for 3½ years, with no clear idea of what box would be its home. It could have been a derivative of the Displaywriter. It could have been the 68000-based machine produced by the Instruments Division. It could have been implemented on Multibus cards. It could have been stuck inside a 3270 terminal. It could have been something brand new.

But it was none of those. The processor, memory, and communications controller boards were built to PC specifications, and the XT became their home. Likewise, the 3270 PC is built on that familiar low-slung cabinet. Inside the 3270 PC, however, are many changes, both in hardware and control program—although not so many that it can't run PC programs. In fact, it is something of a champion juggler, able to maintain as many as seven different sessions simultaneously. Four of those are 3270 sessions, where each is a separate log-on entity to the mainframe. One session is a standard PC-DOS task, and there are two "electronic notepads" that permit full-screen access into a dedicated file. All of the sessions can be displayed on the screen in windows. The user can change the shape and size of the windows and move freely between foreground and background tasks. The color display is strikingly clear, giving some of the highest legibility we have seen yet on color screen.

Who will buy the 3270 PC? Anyone who is a potential customer for a 3270-compatible terminal will have to give this machine a hard look. The multi-session capability alone is a significant productivity aid to programmers and will also be useful to the professional or knowledgeable worker who requires multiple simultaneous access to mainframe programs. Add to that market the attractiveness of running PC programs locally, throw in the electronic notepads, and you have got a winner.

Bigger Mainframes

It doesn't hurt IBM one bit that products like the 3270 PC will be more demanding on mainframe resources. More sessions mean more demand for compute power. More demand means bigger mainframes. Who benefits? The users and, obviously, IBM. Less obviously, the MIS managers reap a harvest, too. Instead of husbanding a scarce, expensive resource, they will increasingly find themselves controlling a corporation-wide network, with the mainframe as its hub. There will still be lots of noncentralized personal computing going on, but users who require access to corporate databases for their personal computing will have it easier than ever.

What then, is the rationale for the

New Rules In The Mainframe Game

IBM has moved the target for hardware and software developers and competing microcomputer manufacturers.

Software developers for the PC, microcomputer competitors, and terminal manufacturers are undoubtedly losing sleep over IBM's two new PCs the XT/370 and the 3270 PC.

Several IBM watchers see the XT-370 in particular as the beginning of the end of open architecture on the PC, and the beginning of IBM's push toward Unix.

"It's like a depth charge," suggested IBM follower Hesh Wiener. "We don't know how bad it's going to be until we see the bodies start floating to the surface."

The experts concur that IBM no longer wants to deal with the confusion created by the PC open architecture, which allowed many independent softwhich allowed many independent software (and hardware) developers into the lucrative PC marketplace. The problem has been aggravated lately as corporate PC users demand a link between their PCs and the vast amounts of data stored on giant IBM mainframes—at least three-fourths of the world's computers.

Mainframe Access

Now with the XT/370 (which costs approximately $10,000 to $15,000) users get both a PC and a direct access to a mainframe running VM/CMS. Importantly, IBM is keeping its Motorola 68000 and the VM software in the XT/370 proprietary.

"In the beginning IBM wanted a fragmented market. Now it's chaos. They are not in control of their destiny and they don't like it," said Robert T. Fertig, referring to companies such as MicroSoft, which provides the operating system custom made for the PC.

"Ultimately," continued Fertig, a consultant who started in the mainframe business, "they're going to have to come over to UNIX. It's the only operating system with multi-tasking, multi-work-

The experts concur that IBM no longer wants to deal with the confusion created by the PC open architecture.

station capability."

And, added the Greenwich, Connecticut-based IBM watcher, the market is moving toward the 32-bit machines, also ideal for UNIX.

"The XT/370 doesn't auger well for Compaq and the other plug-compatible manufacturers," said David Ferris of the Ferrin Corporation in San Francisco. "It's harder and harder for the plug compatibles to remain compatible."

Ferris, whose company provides personal computer services to large organizations, is less concerned about users and software developers being hurt by the IBM senior products. IBM doesn't want to discourage the developers who build "value added" into their products, and it doesn't want to handle service and maintenance that are resource-intensive for IBM, according to Ferris.

"And most PC users won't find the XT/370 particularly attractive," he added. "VM/CMS is not as friendly an environment as PC-DOS."

Not For Novices

Both Wiener and Fertig emphasize that at this stage the XT/370 is for big-systems engineers and programmers—not novice PC users. (Thus "personal" PC users can continue to run programs available for the various independents.)

XT/370 is perfect for the small to medium-size company that wants to develop new System/370 programs and maintain its existing ones. In the past, programmers had to do maintenance and testing when the system was not in production use.

Wiener, who works at *Technology News of America* in New York, gives the example of a shoe store chain that can develop programs on the XT/370 at its headquarters and distribute that same program to its local shoe stores, which are also running the XT/370. Each local shoe store then compiles its sales and tax data, for example, and transmits it to headquarters. Hospitals and big accounting firms are just two other examples of sites where the XT/370 would be apropos.

There are two other big ramifications to the new XT/370:

- Local users, as in the shoe store example, can now also access IBM's growing service bureau business, the Information Network, for additional computer services.
- XT/370 users now have access to more powerful, large systems database management systems programs—some of them already widely installed, such as RAMIS from Mathematica.

—Connie Winkler

XT/370? Can't the 3270 PC, given sufficient mainframe power, do just about everything the XT/370 can do and more? In a word, no.

The XT/370 is truly the machine for all seasons, a veritable panacea for users of all persuasions. Need more horsepower than that wimpy 4.77 MHz 8088 provides? Tap the 370. Need to run mainframe packages in a remote location and can't get co-ax communications lines installed until next June? That's right, XT/370 to the rescue. Thanks to its built-in communications board, the XT/370 can also perform as a 3277 terminal. As if that weren't enough, it also functions as an IBM 3101 dumb ASCII terminal. Unlike the 3270 PC, it doesn't multitask among these functions, but permits rapid switching. Furthermore, the conversion to 370 EBCDIC and PC ASCII files is built in.

There is ample local storage to run several of IBM's mainframe compilers, as well as to store data files. The 4 megabyte virtual address space and inherent speed (half that of a 4321) means that big mainframe applications will run successfully. Examples are statistical packages, query languages, modeling programs, database managers, and internally developed user-specific systems.

In one stroke, IBM has created a new market and a host of new marketing problems for vendors of mainframe software packages. Many of these packages sell for $50,000 and up, and include hotlines, technical help, user newsletters, and periodic updates. Many are covered by service contracts costing more per year than an XT/370.

How to sell to the new market? Include a machine with the purchase price? Develop versions for less money with lesser capability? License software on a per-user basis rather than a per-machine basis? There are no clear answers, not even from IBM. After all, most mainframe compilers and utility programs are purchased on a stiff one-time charge, plus a monthly user fee. My guess is that compiler and utility vendors will go the low-price high-volume route, perhaps eviscerating the high-priced mainframe software market in the process. They will do everything in their power to differentiate the XT/370 from larger machines, but it will become a losing game. The inherent power of the machine will be their downfall. After all, there are already many multiuser operating systems available for the 370, including UNIX. How long will it be before they are implemented on the XT/370? There's simply too much there for just one user. Once the XT/370 comes forth as a multiuser machine, what of the packages that run on the big mainframes? What software vendor wants to be put in the ludicrous position of charging $6,000 for a 9-track tape and $395 for a floppy disk?

Most mainframe packages are programmed to check the system's serial number during operation. Others have a built-in "time bomb" that looks at the system date.

Marketing Issues

The database management vendors may have an easier time of it. They will want to move subsets of their mainframe databases to the XT/370, with versions of their programs giving fast, local access to a truly distributed database. They can easily set up a pricing and support structure to handle the master/slave relationship between the large mainframe and the outpost machines, pricing the system on a per-user basis.

An open question is that of software duplication. Most mainframe packages are programmed to check the system's serial number during operation. Many others have a built-in "time bomb." These programs simply look at the system date and refuse to operate beyond a certain date. Vendors of such programs typically send out quarterly or semiannual updates to their products that, in addition to correcting bugs and adding enhancements, reset the time bomb date. How will the XT/370 affect such practices, especially in light of the machines outside the rigid rules of the data processing department? DP managers, long familiar with such practices, have no trouble dealing with the demands placed on them by the software vendors. Will laboratory managers and personnel executives fare as well?

A final question involves the impact that the XT/370 will have on the PC's open architecture. IBM watchers are still uncomfortable with the way IBM markets the PC. It is, after all, unprecedented in IBM's approach to the market. They are quick to seize every opportunity to accuse Big Blue of reneging on the deal. The mere fact that the 370 card set was designed to drop into an unmodified PC-XT indicates, for the time being, continuing support for open architecture. DOS 2.0 devices should have no difficulty in being addressed as 370 devices. Of course, IBM will not release any of the source code to VM/PC, nor is it likely to encourage anyone to tap into the bus between the 370 board and the memory board.

The 3270 PC and 370/XT are really just the tip of the iceberg. Some chilling new developments will be coming from places other than IBM. In the coming months we'll see a desktop VAX and multiuser PC-compatible systems, to name two significant developments. Designers will create a flurry of applications and system software to fill the gaps that these new products create.

But the real pressure will be on marketing and sales executives as they balance products, prices, and modes of delivery against the divergent expectations of mainframe and microcomputer users. ■

CHARLES DANEY

The XT/370: A Technical Overview

The success of the XT/370's novel architecture depends on the sophisticated illusion of the "virtual machine."

Almost 20 years ago, in April 1964, IBM announced its system/360, a new line of computers radically different from any then produced in the industry. Among its innovations (at least with respect to other commercial products) were the 8-bit byte, the 32-bit word, new circuitry and packaging, and the availability of a large number of general-purpose registers for performing computations. In spite of embarrassing delays in the delivery of these computers and their operating systems, System/360 proved to be a dramatic commercial success for IBM—more dramatic in terms of market share than even IBM's personal computer.

IBM announced the successor product in 1970. The System/370, which was to be "upward compatible" with the older line, at first appeared to offer few advances over System/360, and it was not until 1972 that IBM finally revealed what industry observers had long expected: The System/370 could use "virtual memory." Since then, the 370 architecture has continued to evolve as the industry standard for commercial mainframe computers.

The operating system software for the System/360 and /370 machines evolved along a path that few, if any, observers would have predicted. In late December 1964, during the holiday lull, when telephones were uncommonly silent and active minds had just a little more leisure to be creative, researchers at IBM's Cambridge (Massachusetts) Scientific Center first conceived the idea of a "pseudomachine" control program for the new System/360 computers. Their ideas were rooted in the CTSS time-sharing system developed at Massachusetts Institute of

Technology, literally across the street from the Scientific Center. The purpose of time sharing, of course, was to make the resources of a large mainframe computer available to many individuals at once, as if each person had his own private computer—in other words, personal computing. The IBM researchers, taking this idea one step further, conceived of an operating system that would so thoroughly simulate a "virtual machine" for each user, that programs could be written in any language to run in the virtual machine just as if they were running on a dedicated real machine.

The earliest implementation of this operating system was called CP-40: CP for "control program" and 40 because it was first run on a modified 360 "Model 40" in the fall of 1966. CP was designed and first sold for systems programming. CP-40 was the operating system that created virtual machines for each user. In turn, inside each virtual machine, and dedicated to a single user, there ran a completely different operating system called CMS: the Cambridge Monitor System. While CP-40 was carefully designed and constructed in order to successfully simulate virtual machines, CMS was put together very casually, because its function—providing file and program management services to a single user—was, comparatively, so much simpler.

The story of the subsequent evolution of CP-40 and CMS is a colorful, albeit long one. They were offered to IBM customers as CP-67/CMS to be used on 360 (model 67) computers. They were subsequently integrated into the VM/370 operating system, which IBM introduced to support the virtual memory for the System/370. The CP part of VM/370 was a mostly rewritten version of CP-67, and the CMS part was mostly unchanged. Since that time, VM/370 has evolved through many release versions.

To IBM VM/CMS was never a "production" operating system. For example, it didn't support tape labels. IBM alternately sold VM as a host for multiple systems and attempted to push it into a systems programming corner. Support for new devices always came later for it than for OS. VM is flexible enough that it was possible to implement "handshaking" DOS/VS and OS/VS1 to improve performance of the guest operating system.

It requires at least 7 bits to uniquely identify a specific real page.

In October 1983, IBM announced another milestone in the evolution of both the 370 computer architecture and VM/370: the XT/370 Personal Computer and its operating system, VM/PC. This introduction introduces a few concepts that are essential for understanding the new product and to emphasize that both the computer architecture and the operating system are mature designs, with readily recognizable ancestors more than 20 years old. (This maturity has both its advantages and its disadvantages).

The most important concept in the design is that of a "virtual machine." Real computers have certain components that are fundamental to the computer's operation: random-access memory, general-purpose register, floating-point register, a "program status word" (PSW), and a variety of peripheral I/O devices. It is particularly important to note that virtual devices can be simulated even where the real system does not contain the equivalent hardware. VM, for example, was used to effect 32-bit addresses on machines with 24-bit addressing.

The most important function of an operating system on a shared mainframe computer is to allocate these scarce resources among all users of the computer, of which there may be hundreds. This must be done in such a way that each user gets a "fair" share of the resources (according to his priority), and that no user can interfere with another's rightful use of the resources.

Creating an Illusion

The way that the CP portion of the VM/370 operating system accomplishes this objective is by creating the illusion for each user that he has exclusive use of these resources in his own private "virtual machine." Many ingenious artifices are required to sustain this illusion, but in essence what happens is that only one user at a time is really "running," and during that time, the one user has exclusive use of the real-machine resources. When the user's allotted time is finished, private copies are made of the registers, PSW, for instance. Another user is selected to run, the registers and PSW are reloaded from the new user's private copies, and the new user's program is started.

The most important special case involved in simulating a virtual machine is the handling of "virtual memory." It is possible to imagine handling virtual memory just like other resources, that is by letting a user access real memory while he is running, copying all of his memory to a private area when the user's time is up, and then loading memory for the next user. This strategy is called "swapping" and is actually implemented in some form or another on many time-sharing systems. However, some models of System/370 provide for hundreds of megabytes of virtual memory, and even the XT/370 allows 4 megabytes, so swapping is quite impractical.

Instead, the approach taken by VM/370, as well as by its descendant VM/PC, is to use "memory mapping" and "demand paging." This requires special hardware in the computer to perform what is called "address translation." This means that when the computer is in "translation mode," all addresses actually used by a program are "virtual" and have to be translated or "mapped" to real storage addresses. Such translation hardware was developed for the original 360 Model 40 used at the Cambridge Scientific Center to

develop CP-40, and it is similar hardware that eventually endowed System/370 with virtual memory capability.

All address translation hardware uses tables called "page tables" in order to store the real address that corresponds to any virtual address. There must be one table entry for each possible virtual page address. A "page" is simply a unit of storage, which on the XT/370 consists of 4096 contiguous bytes. Pages must begin at an address which is an even multiple of 4096. Since the XT/370 supports up to 4 megabytes of virtual memory, it can have at most 1024 virtual pages. Thus page tables on the XT/370 have 1024 entries.

Each page table entry, in turn, consists of the address of a real storage page and several additional bits of status information. Since the XT/370 has just 512K of actual RAM storage addressable by the 370 instruction processor, there are only 128 real pages. Thus it requires at least 7 bits to uniquely identify a specific real page. In addition, there must be at least 3 bits of status information for each page, making a total of 10 bits. It happens that each page table entry on the XT/370 is 12 bits in length, so there appear to be 2 bits left over. One can speculate that these might be used to support more real memory at some time in the future.

The way address translation works is that every time a program references a page, the hardware checks the page table entry for that page. One of the status bits indicates whether the page is actually resident in real storage. If it is, the real page address is retrieved and used. Otherwise the page has either never been used before, or it has been used but is available only in a copy kept on the hard disk. In either case, the operating system is interrupted and presented with information that indicates which page is required. The operating system must then either supply a page of zeroes or fetch the saved page from the hard disk. Once the desired page is loaded in memory, the page tables are updated appropriately, and the program can be restarted from where it left off.

Program Thrashing

This whole complex process is called "paging," and even casual users cannot afford to ignore it, because it may be the principal source of a machine's very slow performance. As long as virtual memory has existed, people who develop applications to use it have recognized that it can cause severe performance problems. Basically, although virtual memory can be a boon for the application developer because he can use it to avoid constructing complex overlay programs and avoid doing his own I/O to handle large arrays or matrices, it can also be a bane if stretched beyond certain hazy limits. If a program ever acts in such a way that it references a different page for almost every instruction, and if there isn't enough real memory to hold most of the virtual memory, an unpleasant situation known as "thrashing" may result. Especially since the Winchester disks used on the XT/370 are much slower than disks used for paging on mainframe 370's, it can safely be predicted that developers of applications for the XT/370 will have to confront the demon of thrashing.

Winchester disks used on the XT/370 are much slower than disks used for paging on mainframe 370s.

But 512K Ain't Bad

On mainframe 370s using VM/370, the CP part of the operating system, as has been said, handles all of the management of real resources required in order to simulate a virtual machine for each user. In the XT/370, a very large part of this work is unnecessary, since there is only one user. However, since there is still virtual memory to be simulated, it is necessary that code to do this be present.

There is, in addition, the simulation of I/O devices. On a mainframe System 370, each peripheral I/O device is associated with one or more "addresses." These addresses, however, are not related at all to storage addresses, either real or virtual. This architecture is in fact quite unlike what is found on microcomputers; there are no ports and no direct memory access (DMA). Instead, any program that wishes to communicate with an I/O device must provide a "channel program," which consists of instructions to the I/O device and where to put or get data. A special instruction ("Start I/O") is then issued which indicates which channel program and which device should be used.

Now, just as with memory, the concept of a virtual machine provides for both real and virtual I/O devices. And similarly, there are both real and virtual device addresses. It is the responsibility of the CP part of VM/370 to translate virtual device addresses and channel programs into real ones. This is probably the most complex part of CP. Since the VM/PC control program does in fact support a virtual machine, it too must simulate virtual devices. The process by which it does this is, if anything, even more interesting than the analogous process in VM/370. Although the XT/370 does not support the SIO instruction as such, there is another special instruction called "Diagnose," which does almost the same thing. Effectively, the Diagnose instruction specifies a virtual device address and the equivalent of a channel program, and the VM/PC control program interprets these to produce the desired effect. Of course, the diagnose instruction is issued from inside the CMS portion of VM/PC, which is usually at a much lower layer than the user's application program.

For example, the user's virtual machine in VM/PC operates with one or more virtual disks at certain conventional addresses. These virtual devices have been known since the earliest days of CP/CMS as "minidisks," since they were

implemented as small partitions of real disks. VM/PC implements such virtual disks in one of two very different ways. In the first case, a minidisk is either a partition of one of the Winchester disks on the system or it can be on a floppy. In the second case, the minidisk can actually be resident on a mainframe running VM/370 to which the XT/370 is attached. A configuration program is provided by which the user or administrator of the XT/370 can specify exactly how big the virtual disk is and where it should reside.

In either case, it is the responsibility of the VM/PC operating system to simulate the given I/O instructions and read or write the data as desired. If the data are "local" to the XT/370, that is, on one of the attached hard or floppy disks, then VM/PC sets up a control block and notifies the 8088 CPU. The 8088 CPU always has a copy of PC-DOS resident in private memory of its own (on the system board), and finally performs the required I/O using standard PC-DOS services. (Note: VM/PC has been carefully designed to use an unmodified XT system board and unmodified DOS 2.0, so any desired device, including a non IBM hard disk, can be supported.) Thus, CMS minidisks are actually single PC-DOS files, and hence can be moved and copied (but not interpreted) with standard DOS utilities.

If, on the other hand, the minidisk is "remote," on the mainframe to which the XT/370 is attached, then VM/PC communicates with a server process running on the mainframe to read or write the data. The process is thus very similar to the way file servers are implemented on local networks. (What is especially nice about this is the fact that a program need *not* be concerned with the physical location of a file. Thus, many mainframe applications will not require modifications.)

Output to the printer is handled much the same way. Here again, the printer can be attached to either the XT/370 or to a mainframe the XT/370 is communicating with. The actual destination of printer output at any point in time is under the control of a SPOOL command. Again, if the printer is local, VM/PC notifies PC-DOS to do the actual I/O. Or if the printer is remote, VM/PC communicates with the same server program on the host to do the work.

One last function of the CP portion of VM/PC needs to be mentioned. There are a number of commands the user can issue to CP in order to control his virtual machine. SPOOL is one of these. Others have to do with managing the virtual device configuration. Still others are useful for debugging and allow the user to examine or change memory and registers. In particular, there is a very powerful TRACE command that allows the user to get control when specified events occur, like branches, alterations of storage, or execution of special instructions.

The printer can be attached to either the XT/370 or to a mainframe.

Layering

It is useful to think of the XT/370 and VM/PC in terms of layers. At the lowest layer, there is the physical hardware. This consists of 768K RAM, four different CPU chips (an 8088, two 68000s, and an 8087), address translation hardware, a special card for communicating with a host mainframe as a 3270, and all the other standard circuitry of an ordinary PC XT plus peripherals. On top of this a user first invokes PC-DOS in the normal way. Then VM/PC is called just like any other DOS application program. The VM/PC code is loaded into the special 370 memory card and the 370 processor is started, which leaves DOS and the 8088 quiescent until I/O is required.

The next layer is the CP portion of VM/PC. As has been described, this part has responsibility for managing the "real" hardware and simulating a virtual machine and memory. Of course, at a lower layer, PC-DOS is still there managing the local I/O devices. Thus PC-DOS functions as a kind of "microcode" in creating the illusion of a real System/370.

The next layer up, closest to the user, or at least to his application, is the CMS portion of VM/PC. This is, remember, the "operating system" that controls the virtual machine and provides file system and program management services to the application program, and much more besides. A user can issue commands directly to CMS to invoke a wide range of functions. In fact, the CMS command language does not, for the most part, make any distinction between commands, system utilities, and user programs. A command or utility or application is invoked simply by specifying its name. Many CMS commands, as well as all user programs and utilities, such as compilers and editors, are simply executable files stored on a minidisk. VM/PC does not include support for some CMS capabilities that require a "second" virtual machine, including IBM's powerful file access method VSAM, detached processing, and inter-user communications.

There is also a command interpreter known as EXEC2. Sequences of CMS commands can be placed in EXEC files and executed together much like PC-DOS BAT files. However, EXEC2 is really a complete programming language with variables, control structures, and extensive string-handling functions, so that it is much more like the Unix Shell facility. Entire applications, and very sophisticated ones at that, have been written for VM/370 using EXEC2 and basic building-block tools to communicate with the file system, the user's CRT, and other I/O devices. This ease of constructing applications with simple building blocks is undoubtedly at the heart of the reason why VM/370 has been so popular on mainframe 370's . . . just as UNIX has been in its sphere. Now that the XT/370 has arrived, VM/PC is likely to achieve an equally wide popularity. ■

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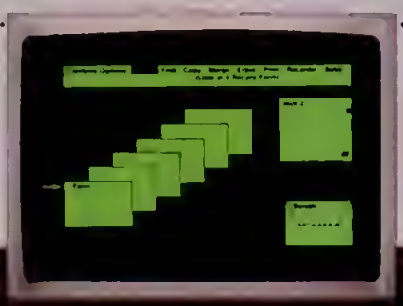

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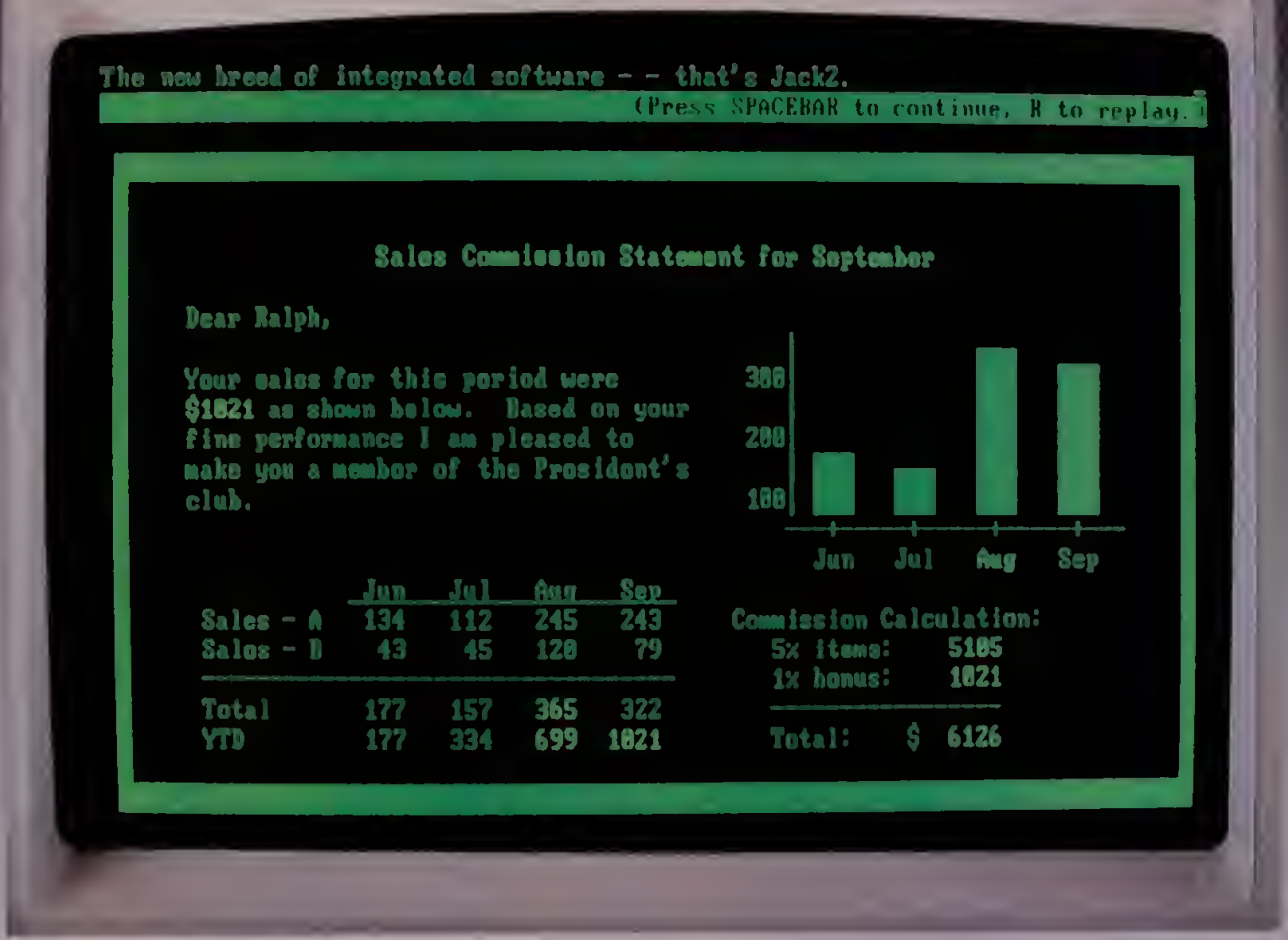
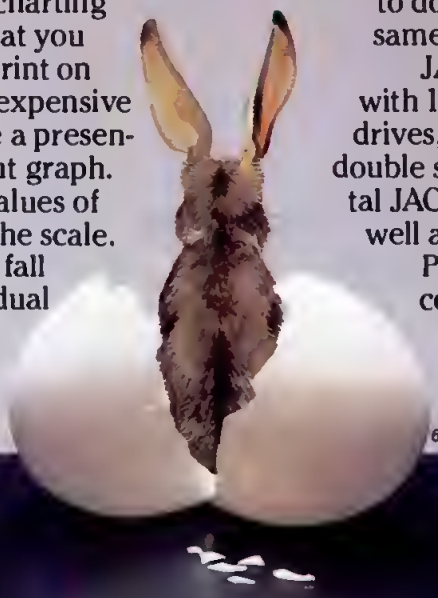


right on the screen, line by line, column by column. Plus, you can change the original form at any time, adding, deleting or altering fields. To reformat all previous records, simply update them, using the new format without any loss of data.

The beauty of the JACK2 charting function is in its simplicity. What you see on the screen is what we print on the page. There's no need for expensive plotting equipment to produce a presentation quality bar chart or point graph. You determine the titles and values of the x and y axes. You specify the scale. You choose whether headings fall below the line or above individual bars. Or let JACK2 decide.



So, if you've been searching for a new breed of integrated software for the IBM PC and XT, you've found it. From word processing, to spreadsheets, to data base management and charting, only JACK2 will let you do everything you've always wanted to do. On the same screen. At the same time.

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Jack2

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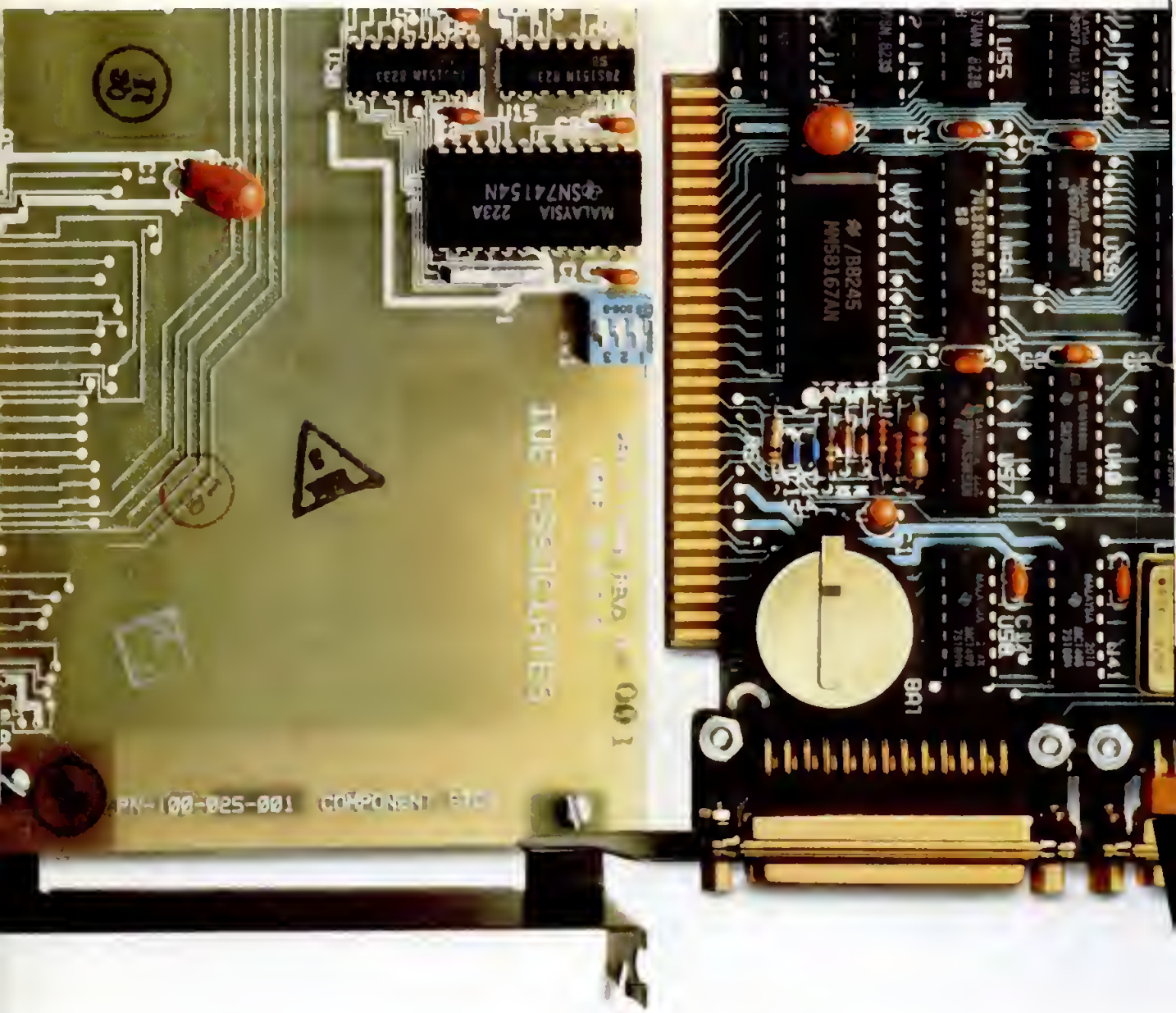

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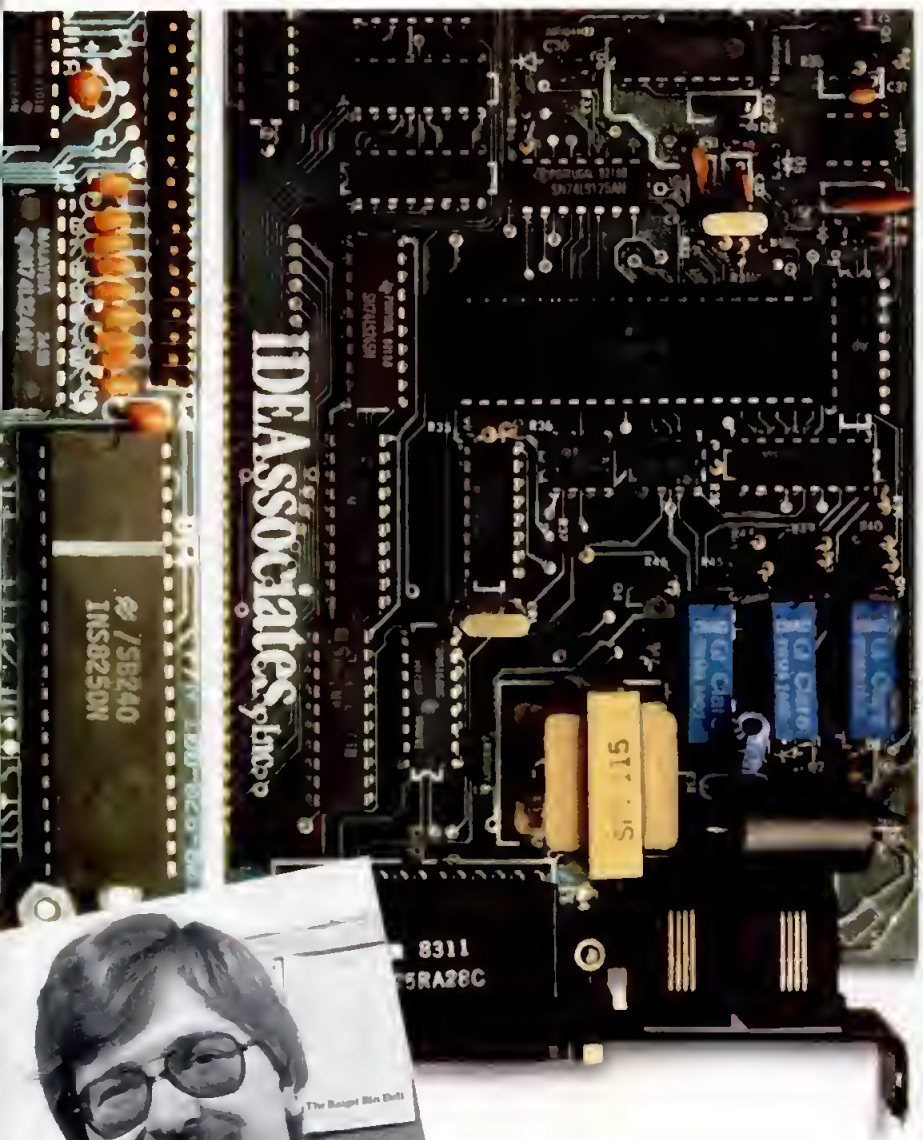

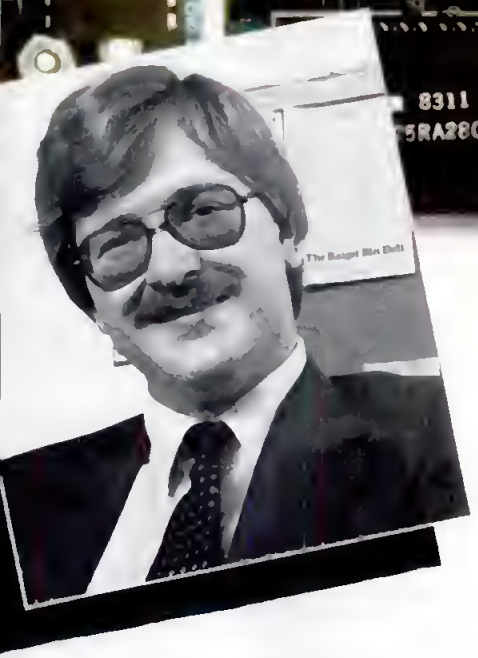

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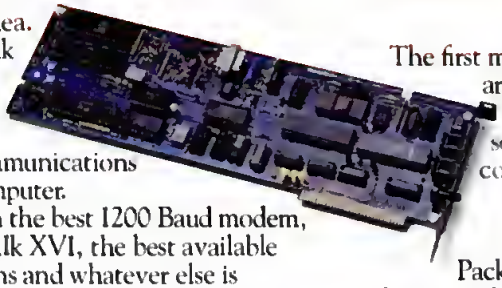

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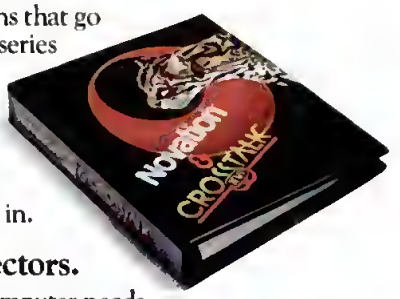

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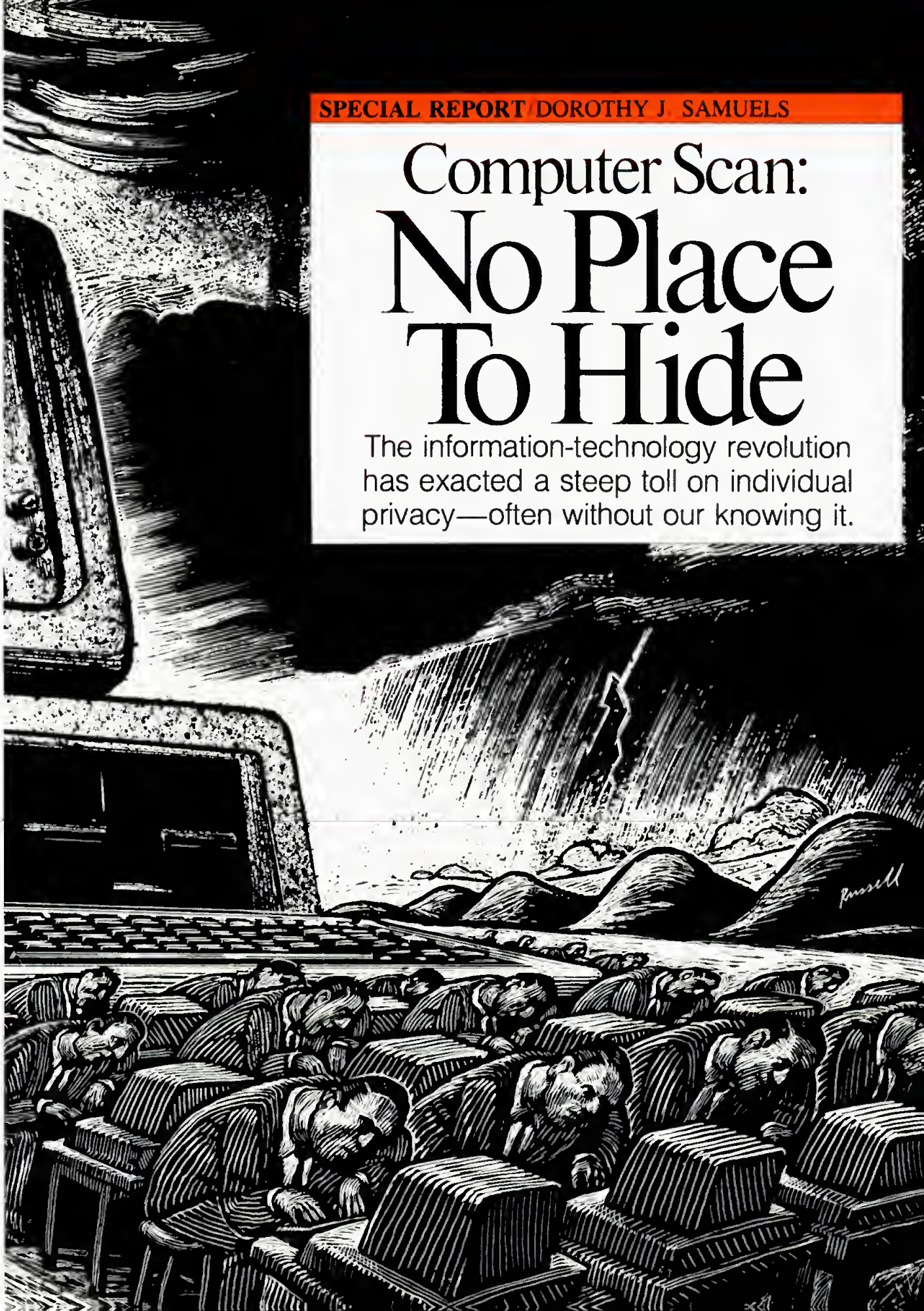
SPECIAL REPORT / DOROTHY J. SAMUELS

Computer Scan: No Place To Hide

The information-technology revolution has exacted a steep toll on individual privacy—often without our knowing it.



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CIRCLE 830 ON READER SERVICE CARD

As we arrive at the watershed year 1984, George Orwell's vision of a society devoid of privacy no longer can be viewed as mere science fiction. In the years since Orwell penned his classic novel, *1984*, technological advances have made it possible for computerized databanks to communicate with one another—and what they're communicating about is us.

The advent of a vast computer network storing the most intimate details of our personal and business lives has altered our notions of privacy in a fundamental way. To a disturbing degree, the computer has become "Big Brother" and those who have detailed dossiers on our lives have become our "thought police."

Though it has enhanced modern lifestyles in many ways, the revolution in information technology has exacted a terrible, unintended cost on individual liberty. This immeasurable cost is the dark side of the truly positive advances in computer science that have occurred over the last 2 decades. In a way, we have become victims of our own success.

Walter Cronkite sums up this dilemma in his foreword to David Burnham's excellent account of *The Rise of the Computer State* (Random House, 1983). "Without the malign intent of any government system or would-be dictator," writes television's venerable journalist, "our privacy is being invaded, and more and more of the experiences which should be solely our own are finding their way into electronic files that the curious can scrutinize at the punch of a button."

Unless this trend is reversed, we may soon find ourselves in a world where the ability to control public access to personal information is, for all practical purposes, a thing of the past.

Under Surveillance

The magnitude of the problem can be gauged by the truly staggering amount of information on our lives amassed by the government and business. To an astonishing degree, Americans today are interrogated, watched, measured, and counted. Surveillance and electronic recordkeeping of nearly every routine activity, from bank deposits to medical visits, has produced greater efficiency and security. But it's also responsible for a discernible erosion of our ability to live our lives free from outside scrutiny.

Illustration: Bill Russell

The federal government currently maintains an average of 15 files on each American, according to estimates by the Office of Management and Budget (see "Report On Privacy: Who Is Watching You?" *U.S. News & World Report*, July 12, 1982). Closer to home, state and local governments use computers to keep their own files on citizens. A study conducted 2 years ago by New York State's Committee on Open Government, found that state agencies operated 1,776 separate data systems containing 10,799 categories of information about New York residents. Each system contained between two and ten million records.

In the private sector, the dossiers multiply. Retail credit bureaus maintain files on over 150 million Americans. Banks record your checks and other financial transactions. Credit card companies track your purchases and repayment patterns. The telephone company notes the numbers you have called. Insurance companies keep files of the most intimate details of your medical care, from abortions to psychiatric treatment. Taken together, these records comprise a fairly complete, if not always accurate, picture of our lifestyles, our personal tastes, our associations, and even our political beliefs.

Much of the data collected about us is necessary for the performance of a legitimate government or business function. But once the purpose for the data gathering has been served, there is scant justification for keeping this information on file.

It is important to note that most of the information maintained, including sensitive health and financial records, is gathered without any guarantee of confidentiality. Insurance companies, for example, typically require individuals to waive confidentiality as a condition of coverage. Once information is on file, experience has shown that the temptation to use it often proves irresistible. Pledges of confidentiality have been known to fall by the wayside at the mere mention of "national security" or the display of a policeman's badge. Even United States Census files, historically the most sacrosanct of all government records, were opened on at least two occasions: to track down draft resisters during the First World War and to locate Japanese-Americans for roundup into detention camps at the onset of World War II. Left to themselves to balance privacy interests against other concerns, business and government will nearly always let privacy take the fall. The phenomenon recalls Edmund Burke's warning over 200 years ago that "(t)he true danger is when liberty is nibbled away, for expedients and by parts."

No Place to Hide

For individuals with a juvenile arrest record or a history of psychiatric treatment, the existence of these files is a ticking time bomb. Release of the information in these files can result in public embarrassment and in many cases, can lead to the loss of a job. The time when a person could move away from his or her past vanished long ago.

Even for those with "nothing to hide," the specter of computer data banks tracking one's every move has enormous impact. As the former U.S. Senator Sam Ervin, Jr, observed at a 1971 Senate hear-

ing on federal data banks, computers, and the Bill of Rights. "[O]nce people start fearing the government, once they think they are under surveillance by government, whether they are or not, they are likely to refrain from exercising the great rights that are incorporated in the First Amendment to make their minds and spirits free." In other words, the knowledge that we are being watched, that everything we do might be recorded, makes us alter the way we live, sometimes in ways we may not even perceive. After a while, conformity can become second nature. Ironically, the maintenance of computer files, which law enforcers find so useful in the detection of crime, forces everyone to look over one shoulder, just like a hunted criminal.

The argument that people with "nothing to hide" shouldn't be concerned about privacy is frequently heard. The Reagan administration used this reasoning to defend its requirement that elderly and infirm recipients of Supplemental Security Income reveal their income tax returns as a condition of receiving future benefits. People "with nothing to hide" should not object to making their tax returns public, the Social Security administrators declared. This statement drew a challenge from syndicated columnist Jack Anderson, who suggested that these officials submit *their* IRS files for review. Judging by the response, only one official had "nothing to hide."

Ominous Developments

Of course, government dossier-building did not begin with the invention of the computer. Goodness knows, J. Edgar Hoover and his boys did an effective job of trampling on individual rights with their manually kept systems. But the relative inefficiency of index-card notes was a safeguard of sorts. The new technology, which facilitates interaction between the separate data banks of government and business heightens the potential for abuse.

Perhaps the most ominous development of recent years is the rapid growth and nearly universal acceptance of computer-matching programs whereby one agency checks its records against another's, usually in an effort to detect fraud and waste. On a massive scale, information collected by one agency for a specific, often routine and innocuous purpose is being used toward a far different end. Consider these examples:

Interaction between the separate data banks of government and business heightens the potential for abuse.

- The Selective Service System cross-checks draft registration lists with Social Security and motor-vehicle records to apprehend young men who have failed to register.
- The Federal Immigration and Naturalization Service, in its effort to locate illegal aliens, sought access to the New York City Board of Education's computerized file of one million students to gather a list of Spanish surname households.
- The Internal Revenue Service matches "life-style" data maintained by various business information services with its own internal files to trigger tax audits.

Whatever the stated purposes of these computer-matching programs, the technique raises important constitutional issues regarding the presumption of innocence, Fourth Amendment protections against unreasonable searches and seizures, the right of personal privacy, and the right to protect oneself from self-incrimination.

Computer matching programs were utilized by Joseph Califano, Jr., when he served as Secretary of Health, Education and Welfare during the Carter administration, to locate federal employees illegally receiving government benefits. Within the Reagan administration, this practice has become more prevalent. With little thought to the far-reaching consequences, we have embraced this technological innovation. The only limits, it seems, are the bounds of good taste and the imagination of the controlling bureaucracy.

Back to Basics

Ironically, the computer-matching methods used to ferret out fraud and waste are often themselves wasteful and inefficient. A 1982 New York Civil Liberties Union report makes the case that New York's Wage Reporting System—the largest state-level computer-matching program—is "an extraordinarily clumsy and wasteful operation" that "costs far more and saves far less than its proponents claim." The report suggests that less intrusive steps, such as simplifying the rules for determining eligibility and calculating benefits, could be more effective in combating abuse in public assistance programs.

These concerns regarding computer-matching, the subject of Senate hearings in December of 1982, will be the focal point of additional Congressional scrutiny in the coming months. It is increasingly apparent that the legal protections so carefully worked out in the Federal Privacy Act of 1974 have been largely outmoded by the new computer age. What is needed is creative and bold legislation to strictly limit the collection, maintenance, and dissemination of personal information. Equally important is the need for public officials with the courage to enforce it.

Supreme Court Justice Louis D. Brandeis described privacy as "the right to be left alone—the most comprehensive of rights and the right most valued by civilized men." If we care about preserving that right, we must act now. ■

Dorothy J. Samuels, an attorney, is a former executive director of the New York Civil Liberties Union.

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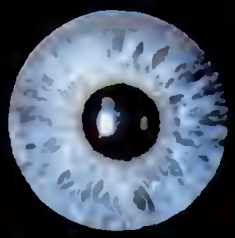

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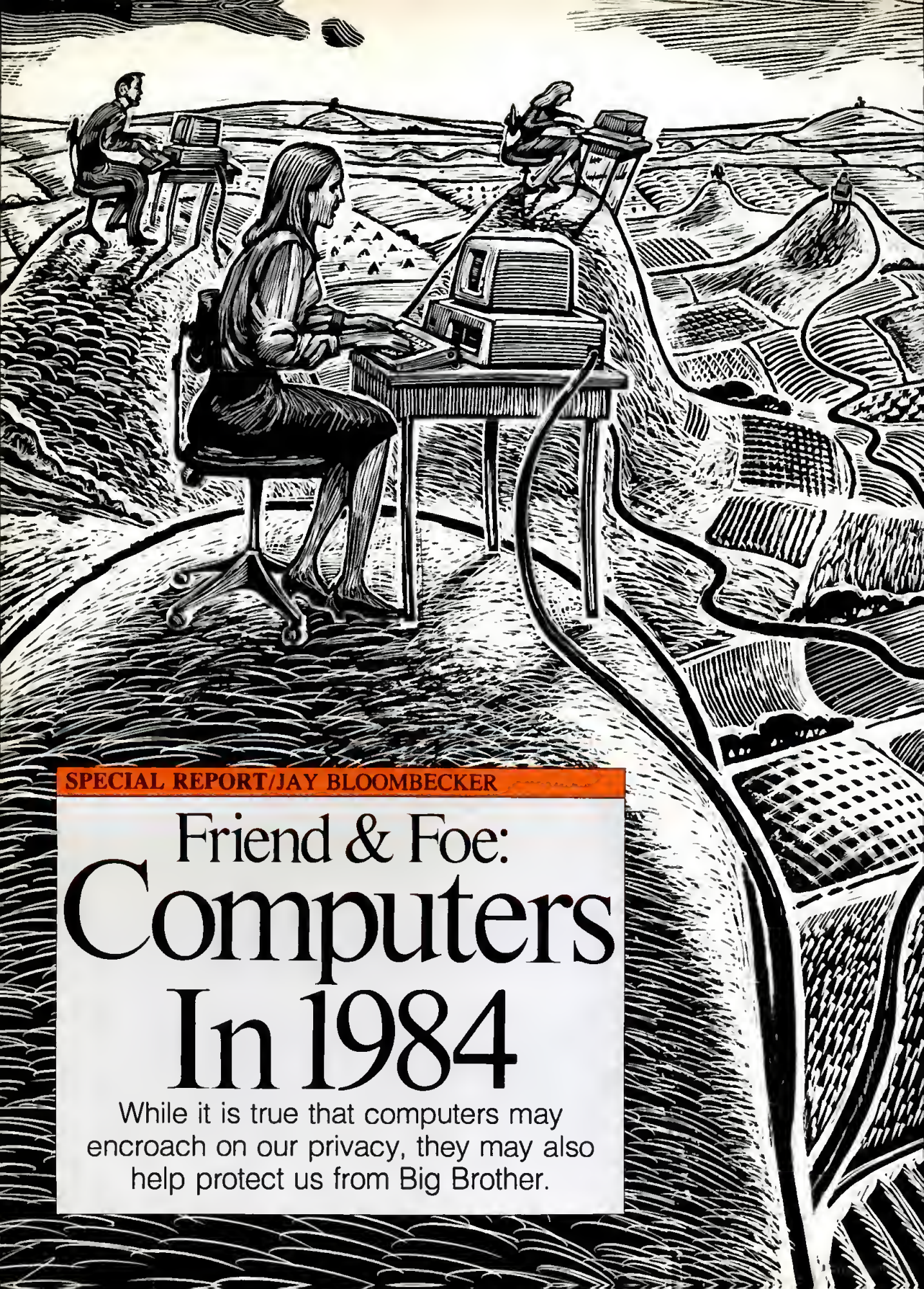

SPECIAL REPORT/JAY BLOOMBECKER

Friend & Foe: Computers In 1984

While it is true that computers may encroach on our privacy, they may also help protect us from Big Brother.

A conventional portable computer isn't so portable.

A conventional computer will take over your office.

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CIRCLE 144 ON READER SERVICE CARD

Like Shakespeare's works, Orwell's *1984* begs rereading. Like the Bible, you can use it to support any number of arguments. I recently reread my high school copy and discovered both an old and a new perspective on the novel.

Some time ago a group called the Fleet Street Corporation issued a letter that read, "Dear Reader: Remember George Orwell's jolting novel, *1984*? His vision of every home wired into a distant central computer with its large information banks seemed like a science fiction fantasy. Well, look up. Orwell's future is almost here . . ."

Yet nowhere in *1984* are computers mentioned. Novel "writing machines"—yes, "Speakwrites"—yes. But computers—no.

Nonetheless, it is difficult to imagine Orwell's negative utopia functioning without computerized help. How else could the information about the large population of Oceania have been monitored and correlated 24 hours a day?

How else could the ruling party have produced and kept track of all of its information? It takes lots of memory and time to keep up the kind of system depicted in *1984*. In the novel, a branch of the government, the Ministry of Truth, exists to do nothing else. "Who controls the past controls the future. Who controls the present controls the past," Orwell explains.

Perhaps the use of computers to construct a single "reality," the only purpose of which is to perpetuate the ruling party would be the gravest computer crime imaginable.

But Orwell believes there's a greater evil. To him, information control is second to the massive assault on human dignity that *1984* represents.

A 1984 Without Computers

Orwell is not only saying that we must keep our information channels free from abuse. He believes that the concept of information control, if logically extended, touches the soul of the human being. Thus the ultimate goal of the totalitarian state is the abolition of all humanity. He gives the following explanation in the text.

"We are not content with negative obedience, nor even with the most abject submission. When finally you surrender to us, it must be of your own free will. We do not destroy the heretic. . . . We convert him, we capture his inner mind. . . . Never again will you be capable of love or friendship, or joy of living, or laughter, or curiosity, or courage or integrity. You will be hollow. We shall squeeze you empty, and then we shall fill you with ourselves."

> Nowhere in *1984* are computers mentioned.

This passage makes it obvious that computers are not necessary to enslave a population.

What is not so clear, however, is the extent to which the use of computers can erode our privacy and whether a sense of lost humanity will result.

Examples of computer uses that threaten privacy are not hard to come by these days. A company called National Incarceration Monitor and Control Services in Albuquerque, New Mexico, is selling microprocessor-based ankle bracelets for "correctional" use. A person in Lake County, Illinois, or the Second Judicial District of New Mexico may be sentenced to stay at home and wear a bracelet rather than take up space in a county jail. If the individual strays from home, no signal will reach his telephone, and the sheriff's office is automatically notified that a probation violation has occurred.

In a move believed to be unrelated to the impending return of Hong Kong to greater Communist Chinese control, the government of Hong Kong is experimenting with a system of electronic surveillance of automobiles as they pass checkpoints along Hong Kong's major roads. Every car on Hong Kong island would be fitted with a device that would identify the car electronically to the 300 checkpoints set up to account for the use of Hong Kong's roads. A reporter for the *Los Angeles Times* called the plan "Orwellian," but government authorities claimed to be doing nothing more than applying advanced technology to Hong Kong's traffic problems.

The American Civil Liberties Union (ACLU) continues to pursue litigation against the Los Angeles Police Department's (LAPD) Public Disorder Intelligence Division. Documents released so far suggest that a private organization called Western Goals has been distributing raw intelligence obtained from LAPD about a number of people whose activities were far more easily classified as political expression than attempts to overthrow the government.

Though it is still unclear whether the organization distributed any information collected by the LAPD, it is known that the LAPD kept files on Mayor Tom Bradley of Los Angeles and a number of other prominent figures.

New Energy

Computers are a new form of energy. Those who take best advantage of them will gain the most power in the years to come. Though the economic and political power of large institutions or the government may help computer users to expand their power, individual users have opportunities to become influential, too.

While rereading *1984*, I was struck by ways in which computers may help protect us from totalitarianism.

In the novel the Party sets out to sever each individual from all relationships that might challenge its power. Orwell describes the individuals of this society like this: "Cut off from contact with the outer world by incessant wars and limited communication facilities and with the past by information control, the citizen . . . is like a man in interstellar space not knowing

which direction is up and which is down."

Unlike the 1984 of the book, ours is marked by a growing access to information. Making "informational connections" with others throughout the world is becoming increasingly simple.

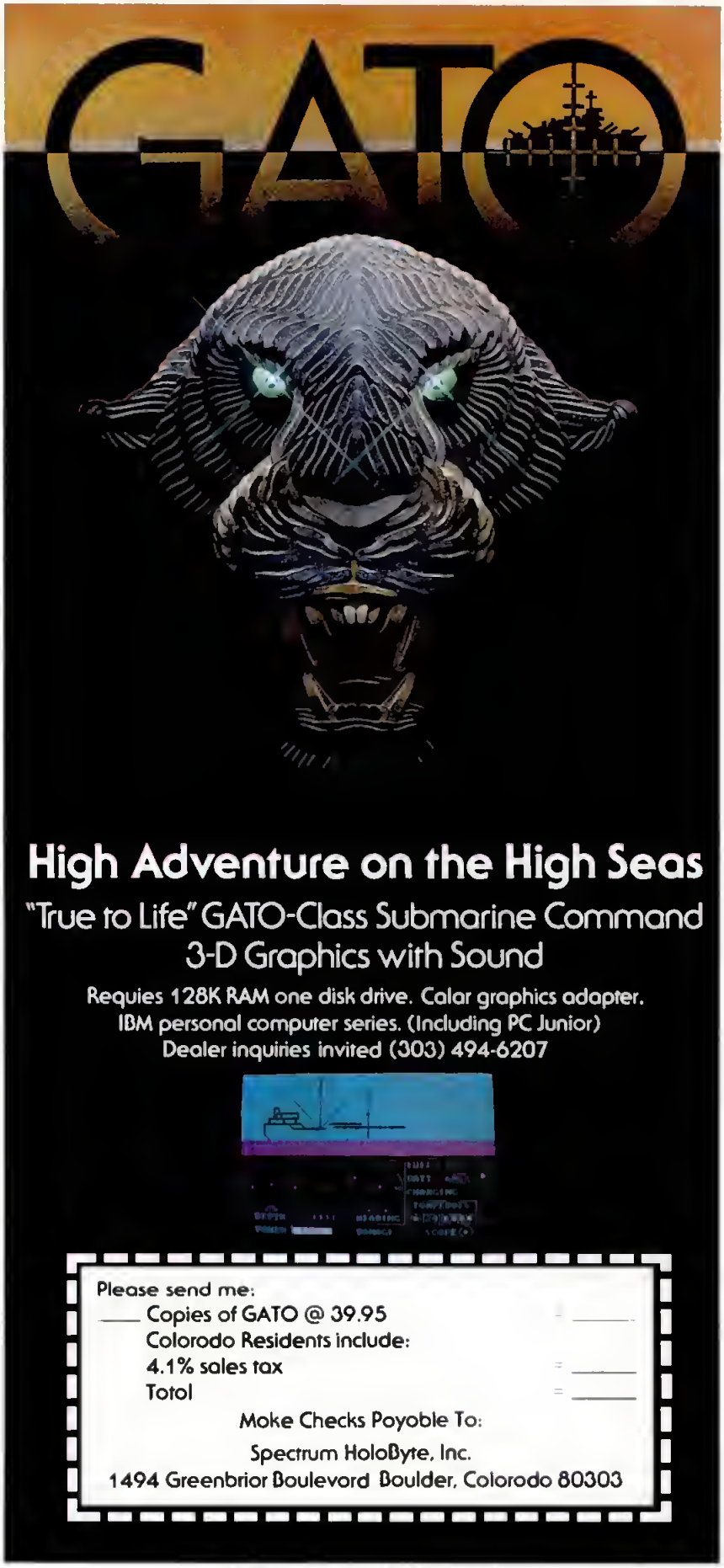
The dispersion of computer power among many users is a great safeguard to freedom of thought. Within limits, the idea that no power can completely control the means of communication is comforting. It is not without a certain smugness that I read about Rumania clamping down on typewriter ownership or learn about how difficult it is to get a computer system in Poland.

Not only can we use computer expertise to communicate with one another, but we can network, form instantaneous groups, meet, discuss, agree, and disappear before any human monitoring or intervention is possible.

Computer power is not only more dispersed, it is more accessible to all of us. The dislocation resulting from the economic importance of the computer and communications industries are forcing those with economic power to invest more in new people, new products, and new ideas. This year, 1984, offers mobility for the computer literate, and even more for the computer wizard. Many computer users are being forced to hire computer-literate people, regardless of their politics or their humanity. They may even hire people like you and me. In short, it's not always easy to tell whether Big Brother is winning or losing.

Look around you. Are the people in your office loving or friendly? Do you often feel joyous or courageous? Is the sound of laughter seldom in your ears? Contrary to Orwell's predictions, we have not lost our humanity.

More devious and more threatening than *1984* is a co-opted society, in which we sacrifice our humanity to gain the material benefits of life made easier by machines. Under either scenario, the computer can be a tool for more or less freedom, depending on how we use it. ■



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And all three monitors come with a shielded cable that plugs directly into the IBM PC or XT.

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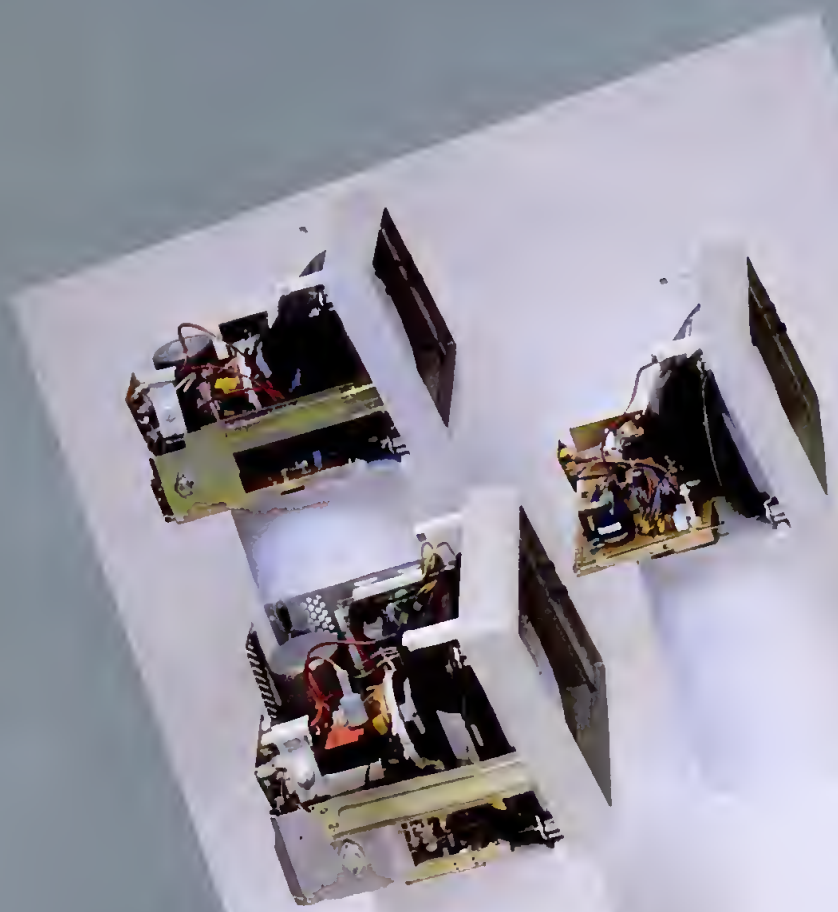

And a

Check the specifications

The HX-12 has the highest resolution (690x240) and the finest dot pitch (.31mm) in its class. And yet it's suggested retail price is comparable to many medium resolution monitors. The HX-12 brings no-compromise color to the PC and now, with the PGS RGB-80 board, to the Apple IIe as well.

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The new SR-12 also features a .31mm dot pitch supporting 690 horizontal resolution. However, by increasing the horizontal scan rate to 31.5 KHZ, the SR-12 can support 480 vertical resolution in non-interlaced mode. This results in a very high quality, flickerless image with the ability to generate text that is truly of monochrome quality, making it equally suitable for word processing and for color graphics. Suggested retail price, a remarkable $799.

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Whatever your needs, from word processing to super resolution graphics, there's now a no-compromise PGS monitor that sets the standard. Ask your dealer for a demonstration and let your eyes decide. Or call for more information and the name of your nearest dealer.

gain.

The new MAX-12 offers you an amber monitor with 720x350 resolution at a suggested retail price ($249) that is actually more power than the leading green-on-black competitor. And the MAX-12, unlike many other amber monitors, runs off the IBM PC monochrome card—no special card is required. Clarity of the MAX-12 is enhanced by **dynamic focusing circuitry** which ensures sharpness not only in the center but also in the edges and corners.

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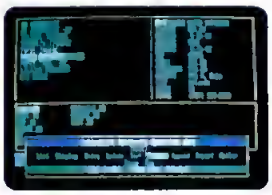
OPEN ACCESS takes its name from the source of its power—a relational data-base manager that gives you access to more data in more ways than any comparable software.

OPEN ACCESS includes an electronic spreadsheet, 3-D graphics, word processor, appointment [illegible] telecommunications [illegible]—all working around the powerful information manager.

1



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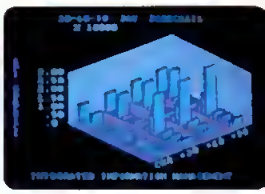

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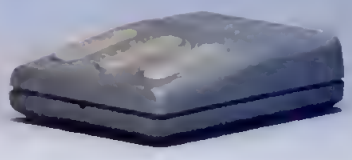
Because they do not have a dedicated relational data-base manager that can quickly direct massive amounts of data, other programs simply can't do what OPEN ACCESS can. Some don't have a communications program, others no dedicated word processor. None have a time management program.

There's just one conclusion: At $595, OPEN ACCESS can do more for you than any other comparable business program on the market. Bar none. But the only way for you to be convinced is for you to see OPEN ACCESS work its magic on your work load. So call your local software dealer today, or call us at SPI, at 619-450-1526.



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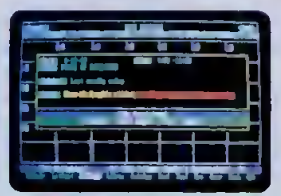
6



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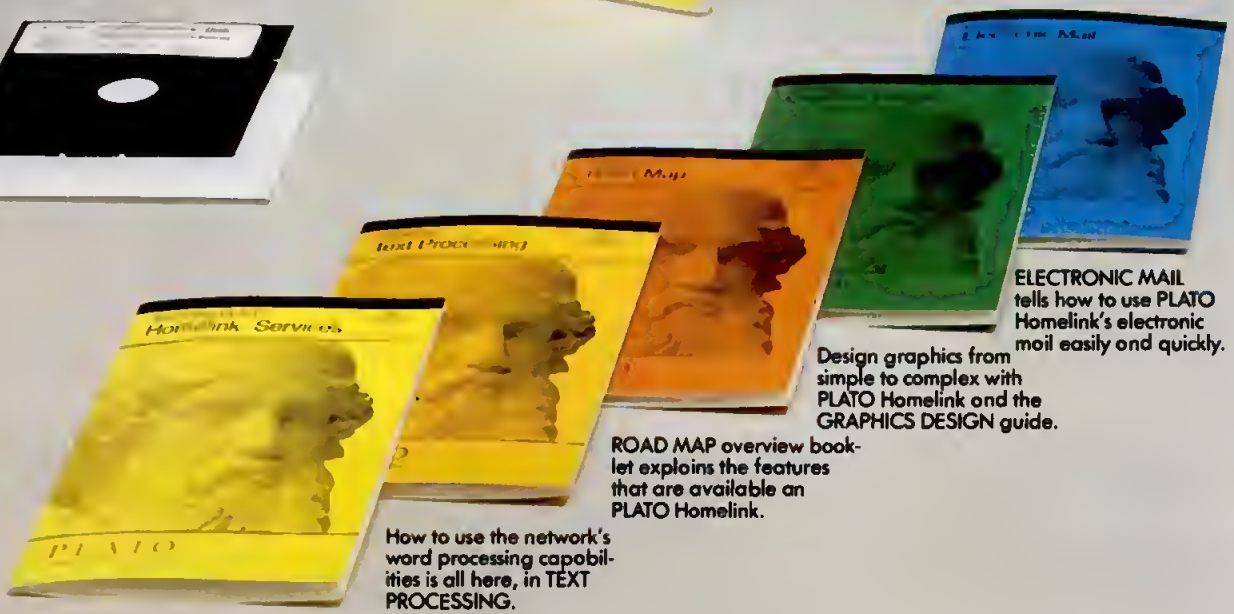

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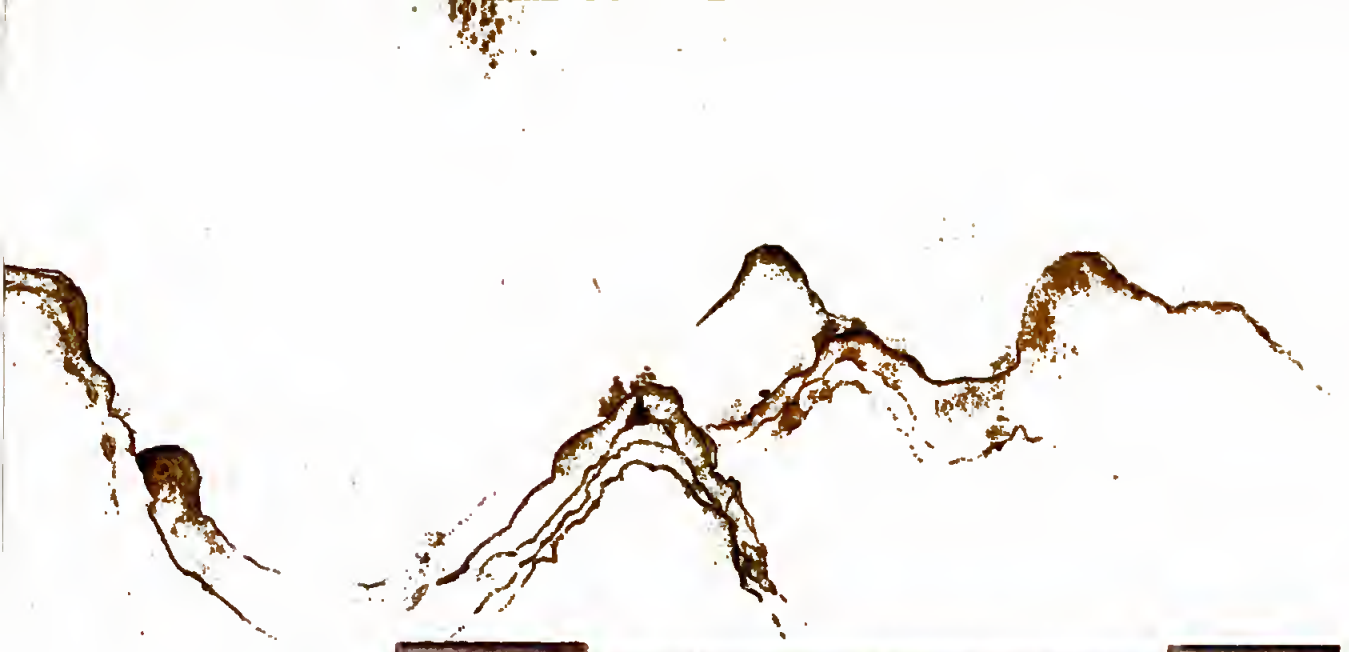

MARKETPLACE/MARTIN PORTER

PC Piracy: Growing By Leaps And Boundaries

The Orient threatens to become a bargain bonanza of PC lookalikes. Though countering the counterfeits is a stupefying task, failure to meet the challenge could leave IBM with Egg Drop Soup on its face.

How the Big Guys Ex

When you are going to expand a thousand PC's you want to get it right. Fact is, if your going to expand one PC you want to get it right. Selection of a supplier for an expansion board is more than guess work. Take a look at the organizations that buy from Qubie'. World leaders in computers, energy, manufacturing, medicine, research and education. Small business and professionals like doctors, lawyers and retailers. And of course, the thousands of individual computer owners looking for maximum expansion for a minimum of wampum.

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sand their PC's & XT's

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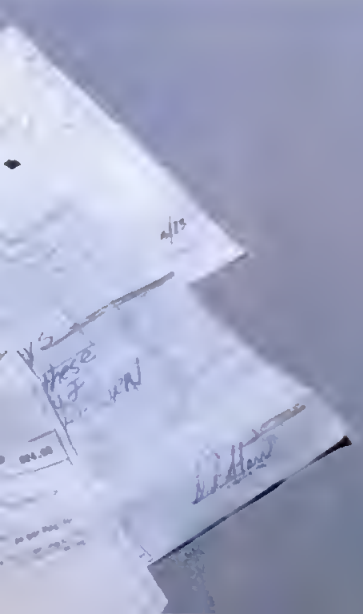

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CIRCLE 384 ON READER SERVICE CARD

Along Apliu Street, in Hong Kong, otherwise known as Apple Street, it is not uncommon to see a variety of microcomputers sitting alongside dried squid, mushrooms, and the latest designer clothes.

This is knockoff heaven, where tourists and smugglers share the bounty of low-cost manufacturing. When visiting Hong Kong, tourists are driven by the goal of returning overseas with an "original"—from shoes to software—at a fraction of name-brand prices.

For the past few years, the computer mainstay of the street has been Apple knockoffs, some manufactured in the nearby district of Sham Shui Po. Often, they look so much like the Jobs/Wozniak original that it is difficult to tell the difference between them and the real McCoy, even though they bear nameplates such as Apolo, Golden II, Pineapple, and Orange. Others look nothing like the Apple, although a peek inside the CPU would reveal the familiar silicon guts of the usual 6502 microprocessor machine. All sell for about $300, or whatever you can wheel and deal with the shopkeeper, whose skills would put a black marketeer to shame.

However, things are changing fast on Apple Street—so fast that the street's favorite fake now imitates the fruit of a different orchard. Judging by the number of IBM Personal Computers lining the vendors' stalls, Apple Street should be renamed PC Place.

Because of the international popularity of the IBM PC, and serious legal crackdowns by Apple on the counterfeiters in Hong Kong, the Kowloon Peninsula, and Taiwan, the newest favorite microcomputer ripoff throughout this part of the Orient has become Baby Blue. Many PCs are manufactured by companies that formerly enhanced their bottom lines by knocking off Apples. Others actually are Apple Computers reconfigured inside the IBM PC box. Still others are new dual-processor micros able to utilize the supply of software (much of it counterfeit) that also lines the stalls and gradually is sold via the gray market in micro-markets throughout the world.

In the case of the IBM knockoffs, the situation—currently the subject of investigation by the International Trade Commission and the Subcommittee on Oversight and Investigations of the U.S. House of Representatives—has become obscured by the question of what, indeed, is an IBM counterfeit? In other words, what is proprietary in the IBM PC?

IBM: What, Me Worry?

The situation in Hong Kong is particularly troublesome since IBM officially denies any knowledge of any problem, even though independent reports have confirmed a proliferation of IBM PC knockoffs throughout the area during the last several months. When asked to comment on these reports, Andy Russell, a communications officer for the company's Far East Division, claimed: "They've seen what they've seen. We haven't seen any fakes here or in Hong Kong." When asked for referral to someone else within the corporation, Russell's retort was equally blunt: "I have just given you the IBM answer."

> Such popular software programs as WordStar and dBase II are readily available in the Hong Kong street markets for only $4.

Testifying before the House subcommittee in Washington in early August, several witnesses reported an outburst of IBM PC fakes and workalikes in Hong Kong and Taiwan.

James E. Tunnell, a former employee of the Osborne Computer Corporation, told the subcommittee, "The most prevalent copies in order of availability are: Apple-compatible computers, Osborne, and, moving toward first place quickly, IBM PC compatibles."

Adding that such popular software programs as *WordStar* and *dBase II* (including documentation) are readily available in the Hong Kong street markets for only $4, he said he had been quoted a price as low as $600 for a copy of the IBM Personal Computer, complete with corporate logo, a 12-inch color monitor, two disk drives, and a 256K memory card.

The domestic impact of this development became apparent following testimony from a Silicon Valley private eye who has been working undercover to investigate the influx of pirated computers into the United States—most of which trace their roots to those same stalls in Hong Kong or to the electronics factories in Kowloon or Taiwan.

The investigator, Richard Camps, vice-president of the Barrick Security Group, San Mateo, California, described an international network of counterfeiters and smugglers that was bringing bootlegged micros into this country daily and distributing thousands of them worldwide. Camps, who testified wearing a hood over his head to retain anonymity, added that several electronics firms in northern California were fronts for counterfeiters in Soviet bloc countries and in the People's Republic of China.

Camps made one comment that sent shockwaves throughout the PC community and put the issue of micro counterfeits into Boca Raton's backyard.

"Manufacturers in Taiwan are now preparing to produce counterfeit IBM Personal Computers," he testified. "We had heard for months that this was coming, but last week we saw the first counterfeit IBM motherboard."

The Chill of It All

The thought of fake IBM PCs being sold on the gray market throughout the United States could send a chill through anyone who is seriously looking for a PC. Could the machine that is being quoted at a

Illustration: Cynthia Watts Clark

bargain price actually be some Taiwanese knockoff, manufactured or assembled overseas by counterfeiters using fake IBM logos and bootlegged boards, CPUs, keyboards, and monitors?

Disturbingly, as of late summer IBM hadn't taken the simplest steps to stop such a potentially cataclysmic development in the marketplace. Calls made at that time to representatives of the U.S. Customs Service in Washington, D.C., and its Pacific Region office, confirmed that IBM had not registered any of its PC copyrights and patents with the appropriate bureau. Such registration would be used by customs investigators and agents to stop counterfeit boards and other components before they made their way, through the gray market distribution channels, into the country and onto the street. The registration costs a mere $190.

Hundreds of dual-processor machines, which can run both IBM and Apple software, already have been seen in Hong Kong markets.

According to Jerome Hollander, a public affairs officer with U.S. Customs, "IBM hasn't registered any copyrights with our offices, and, as a result, we have no basis for seizing any fake PCs. Even if the machine looked exactly like the PC, at this point, we wouldn't have a basis to seize it."

This information is especially troubling given the speculation that a flood of foreign-made PC workalike and lookalike machines will be entering the United States during the coming months. Many of these may be sold, legitimately, as PC compatibles, but others, with the addition of the appropriate nameplate, could be passed off as True Blue itself.

What is the basis for this speculation? For one thing, numerous IBM PC compatibles were announced at an early June computer trade show in Taiwan. Though some of the compatibles are products of companies with high-tech pedigrees, others have dubious roots in the early days of Apple and Atari game console ripoffs. Apple's experience in dealing with one company, Multitech International, an authorized IBM PC dealer in Taiwan, may serve as an example of the type of legal issues IBM could face. Multitech reportedly has developed an IBM PC compatible computer and is prepared to export it this fall to established dealers in the United States and throughout Europe. The company has developed original computer designs, including several high-level Chinese language computers. According to Albert Eisenstat, vice-president and general counsel of Apple Computer, Multitech is the defendant in a civil suit Apple has brought in Taiwan. Multitech is accused of infringing Apple's patent rights on the Apple II in production of its own home micro, called the MicroProfessor. By court consent, Multitech has agreed to change any questionable codes. Apple is checking closely to see if these codes have been changed, and for the time being the company has effectively stopped Multitech International from manufacturing the MicroProfessor.

The Kopy Kat Kids

In his testimony before the House of Representatives, James Tunnell remarked: "It is generally acknowledged in the Asian pirate computer industry that the manufacturer who can control costs controls the IBM PC compatible market. One of Taiwan's strengths has been low-cost manufacturing because of an abbreviated product-design phase."

One working definition for "abbreviated" may come from a conversation Tunnell had with the manager of a Taiwanese manufacturer, which were turning out ersatz Apples before its products were seized by order of the court. The manager, Lin Hsiaochi, remarked: "When you are starting out, you have to copy something. That is the way you gain knowledge and experience. Later, you can create, innovate."

Several Taiwanese "innovations" are on their way to the U.S. market this fall, including an IBM PC compatible, with the 8088 chip, CP/M-86, MS-DOS, 256K RAM, high-resolution display, control board, and both Winchester and floppy disk drives. The product is expected to sell for half of what a similar configuration would cost if it were manufactured here. Another product spotted by Tunnell is a portable version of the IBM PC using 5¼-inch floppy disk drives.

Barry Bergman, an associate of Richard Camps at Barrick Security Group, reports he has seen a unit called the CAT 100, which works like an Apple but looks like the IBM PC. He adds that hundreds of dual-processor machines, which can run both IBM and Apple software, already have been seen in Hong Kong markets. These products make their way to American shores camouflaged in shipments of everything from canned goods to refrigerators, Bergman explained.

Since offering his testimony, Camps has spotted yet another IBM motherboard in the U.S. factory of a foreign manufacturer with a history of assembling Apple fakes.

"I don't know if they were exact duplicates," he said. "They told us they are copies of IBM motherboards, though. When we asked what they were going to do with them, they replied, 'We're making an IBM PC.' "

What Is IBM's?

When asked what was the most important factor in keeping computer counterfeits out of the U.S., Camps replied, "Customs." And when questioned why IBM appears to have been so lax in its registration procedures for the IBM PC, he theorized: "Possibly there is nothing proprietary they can register?"

Obviously, IBM's logo can be pro-

tected, and this famed trademark has traditionally been defended by the company with the vengeance of a Mafia hitman. However, the question of what exactly is proprietary in the IBM PC brings attention to the fine line between an IBM PC "fake" and a "compatible." Why should some foreign manufacturers be deemed ripoff artists while domestic companies bask in the reputable aura of being compatible manufacturers?

According to spokesman Ken Price of Compaq, "The only thing that is proprietary (in the PC) is the ROM. The code on the ROM is what makes a machine compatible and not a counterfeit." However, he added that it is difficult to prove somebody has copied a ROM. "It is not something you can just look at and identify as a copy. It is difficult to get into due to traps and gates, and it would require somebody extremely technical to read."

IBM's answer to the question of what is proprietary in the PC is assertive in tone, but vague in content: "IBM has both copyright and patent protection on numerous parts of the machine, but for obvious reasons we won't be any more specific than that."

According to Apple's Eisenstat, "Their (the IBM) machine is just an engine. The hardware has nothing proprietary in it. There certainly are no patents. Therefore, you can't counterfeit a machine that has nothing counterfeitable." He said his sources told him IBM has developed a task force in Taiwan to deal with PC piracy, although IBM wouldn't confirm the report beyond saying the company has agents at work all over the world.

Eisenstat added that the majority of Apple's suits to date have involved manufacturers who copied the Apple machines, while selling them under different names. Apple nameplates are routinely offered on the Hong Kong markets for $10 each. Will this be an upshot of PC piracy as well?

Bergman remarked, "Nobody in their right mind is going to voluntarily manufacture a PC compatible with the IBM logo on it. Why should they take a chance like that and suffer the wrath of the largest computer company in the world? They don't have to. Once the machines are manufactured and shipped to another country with no labels at all, nothing is going to stop somebody from pasting on the labels later. If IBM says they haven't seen any IBM knockoffs, what they must mean is they haven't seen any exact duplicates, including the IBM logo." ■

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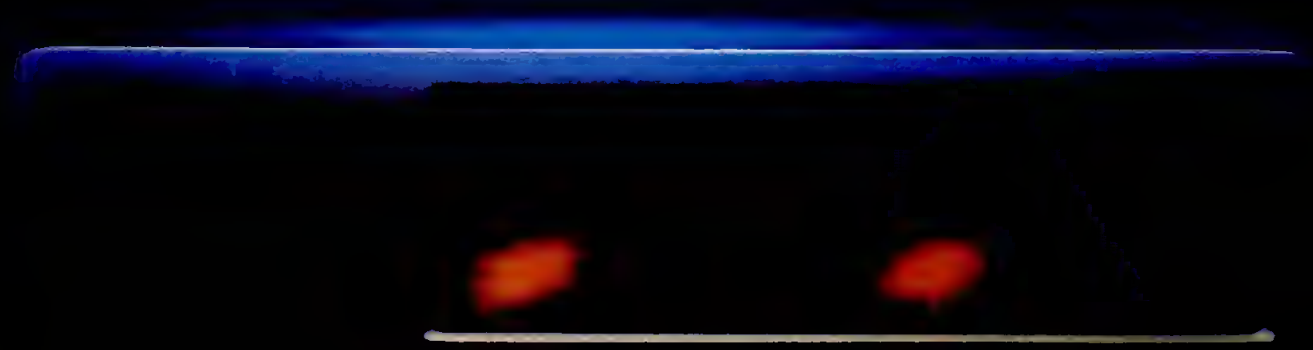

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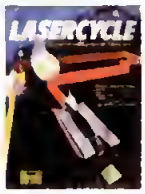

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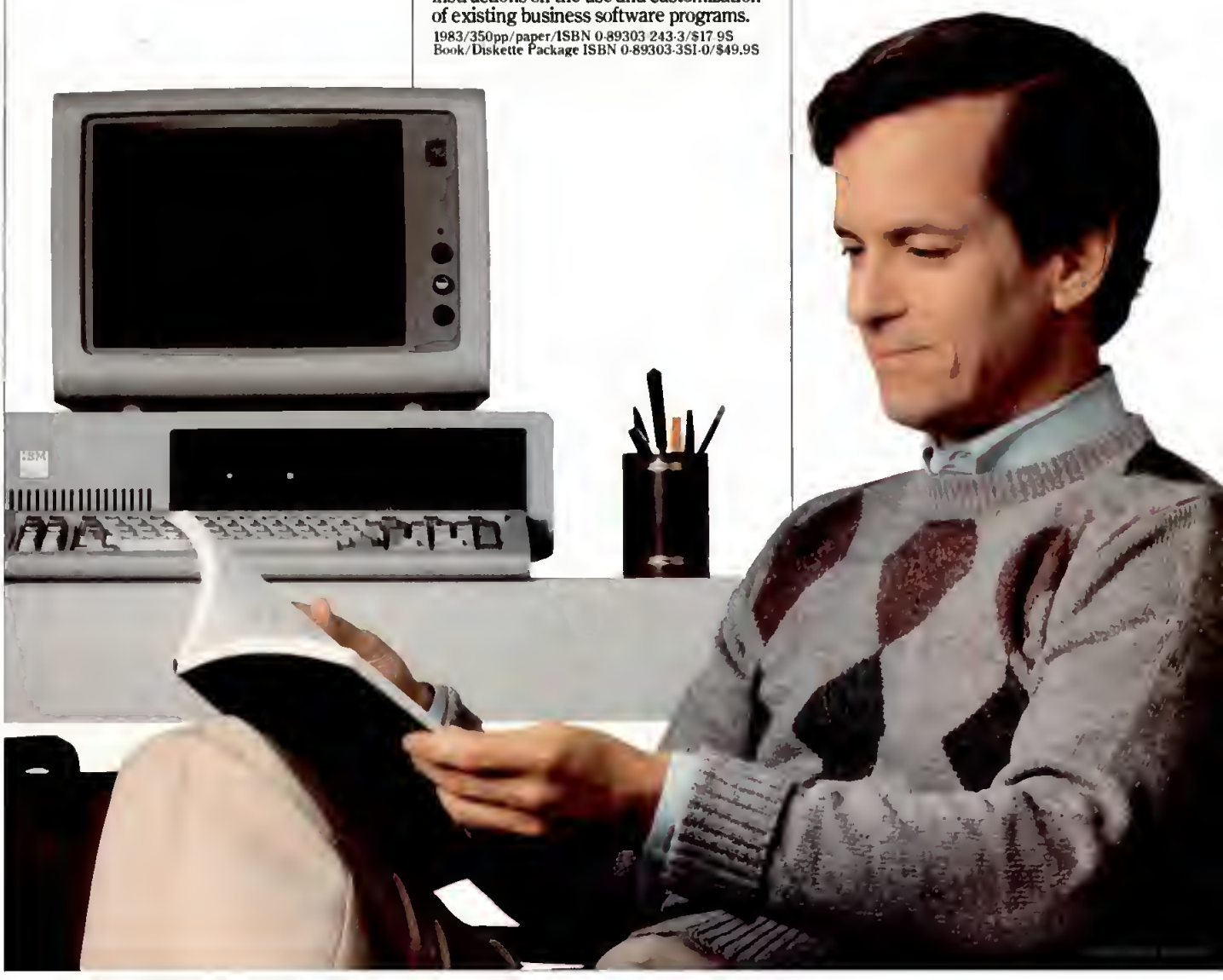

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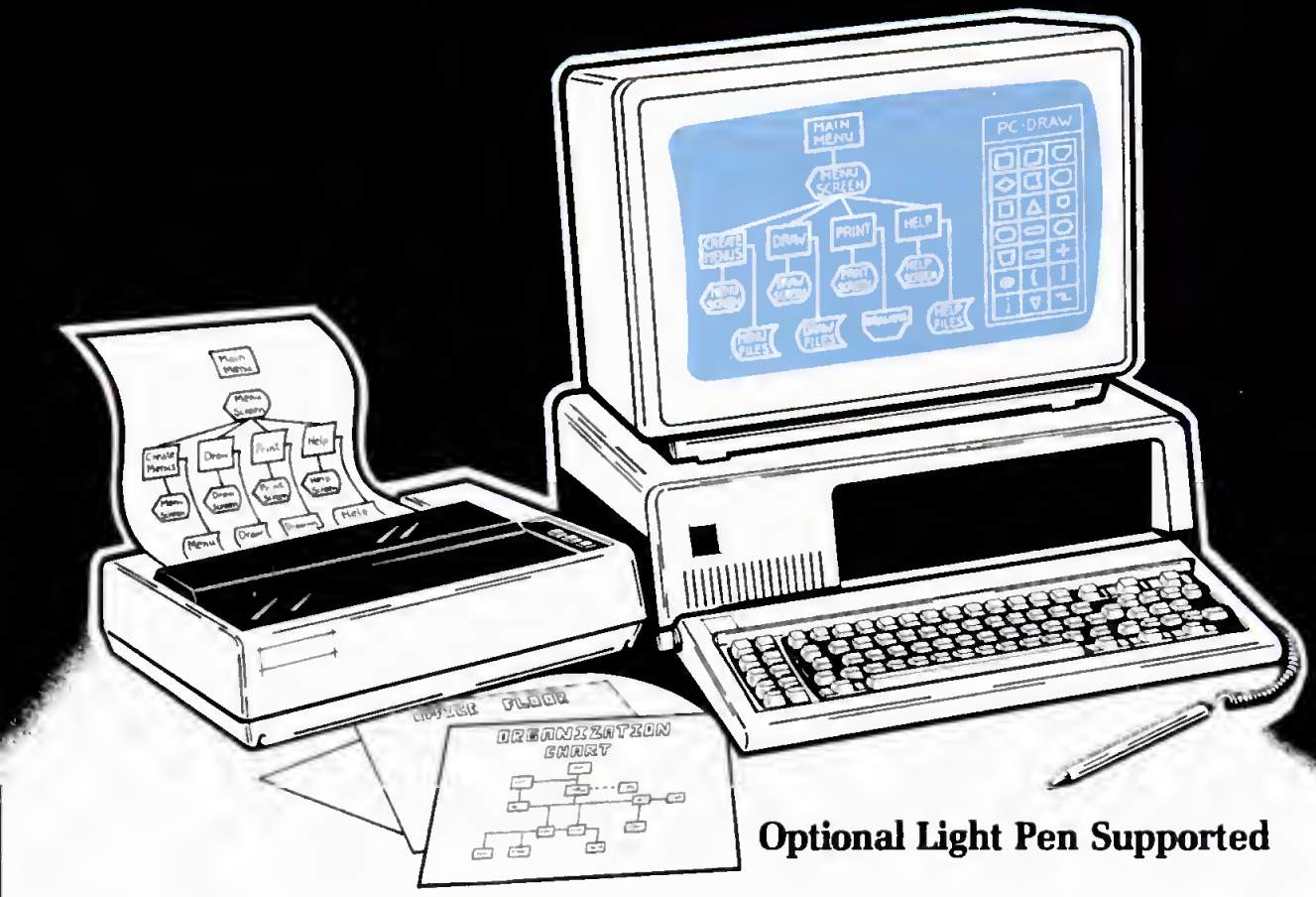

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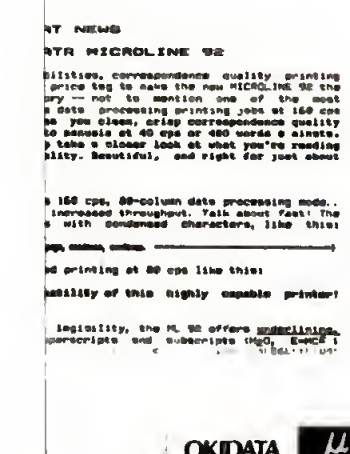

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PROGRAMMING/JOHN SOCHA

For The Handicapped: Toggling Shift Keys

A short BASIC program called Handicap.COM gives handicapped users greater access to the IBM PC keyboard.

At the beginning of August, I wandered into ComputerLand in Salzburg, Austria, to buy the latest copy of *PC*. The June issue had just arrived from the States. It included a letter to the PC Tutor from Dal Vordahl, who is a handicapped IBM PC user. He was looking for a way to convert certain keys on the PC's keyboard into toggles that would allow handicapped users who are unable to press two keys at once to use the Shift, Ctrl, and Alt keys.

It sounded possible, and the PC Tutor even suggested two solutions. But the first suggestion, to check the shift keys 18.2 times per second using the clock interrupt, isn't very reliable. And the second, to rewrite the IBM PC's keyboard input procedures, would take a fair amount of work and the patch would be fairly long—certainly too long to publish.

I thought about other ways to change the shift keys to toggle on and off, and one night I suddenly hit upon a solution. But by then I had run out of time in Salzburg. The summer was dwindling and it was time to pack my Compaq and my clothes and head back to my normal, hectic life in upstate New York. I left my summer retreat in the Austrian Alps, with the book

Illustration: Jeffrey Schner

I'd been working on nearly finished, and began to earn a normal living again.

Back in the States, I finally found time to write a BASIC program to build a DOS patch to change the meaning of the four shift keys. You don't need any knowledge of machine language to use this program, called Handicap.COM, to patch DOS. Even if you're not looking for a keyboard styled for the handicapped, you might be intrigued by the subtle trickery possible with machine language programs.

Inside the Keyboard

ROM chips contain programs we can use but can't change, including the Basic Input Output System (BIOS), a set of subroutines DOS uses to talk to the keyboard, the display, the disk drives, and other hardware. Each time you push or release a key, the keyboard sends a signal to the 8088 microprocessor. This signal, known as an interrupt, causes the 8088 to take a "time-out" from your program to run one of the subroutines stored in the ROM BIOS. This subroutine converts the keys you press into ASCII characters that BASIC and other programs read. It also stores other information in memory, such as which shift keys are currently pushed down.

The BASIC program in Figure 1 continually monitors 4 bits in the memory location used by the ROM BIOS subroutine to store information about the four shift keys: Ctrl, Alt, and the left-hand and right-hand shifts. This program displays a 1 for any key you're holding down—or that it thinks you're holding down. What's that? Does that mean you can fool the keyboard interrupt subroutine into thinking you have the right-hand shift key pressed when your hand is nowhere near the keyboard?

It sure does. Adding the BASIC instruction

```
5 DEF SEG=0 : POKE
&H417,(PEEK(&H417) OR 1)
```

to the program in Figure 1 turns on the right-hand shift key, so that any characters you type will be shifted. The right shift key will be released only when you push and release the right-hand shift key.

The keyboard sends one code when you push a key and another when you release the same key. So the ROM BIOS interrupt subroutine knows when you actually push or release any key. When you push the right-hand shift key after executing the POKE instruction above, the right shift bit is already turned on, so the ROM BIOS subroutine leaves it on. Only when you release the right shift key, sending a key-release signal to the 8088, does the ROM BIOS subroutine turn off the right shift bit. Handicap.COM uses this sort of information to change the meaning of the four shift keys.

```
10 CLS
20 DEFINT A-Z
30 DEF SEG = 0
40 FLAGS = &HF AND PEEK(&H417)
50 LOCATE 10,20
60 IF (FLAGS AND 8)<>0 THEN ALTFLAG=1 ELSE ALTFLAG=0
70 IF (FLAGS AND 4)<>0 THEN CTRLFLAG=1 ELSE CTRLFLAG=0
80 IF (FLAGS AND 2)<>0 THEN LEFTFLAG=1 ELSE LEFTFLAG=0
90 IF (FLAGS AND 1)<>0 THEN RIGHTFLAG=1 ELSE RIGHTFLAG=0
100 PRINT "Alt:";ALTFLAG;"    Ctrl:"CTRLFLAG;
110 PRINT "    Left:"LEFTFLAG;"    Right:";RIGHTFLAG
120 GOTO 40
```

Figure 1: *This BASIC program continually tests the four shift keys and displays a 1 for each key pushed down.*

Building Handicap.COM

The BASIC program in Figure 2 builds the machine language program Handicap.COM on your disk using the DATA statements. The source code for Handicap.COM is shown in Figure 3. These numbers are instructions to the 8088 and are known as machine language because they have meaning to the 8088 microprocessor, but not to us.

When you run Handicap.COM, it attaches itself to the end of DOS in memory and intercepts all interrupts for the keyboard. Handicap.COM increases the size of DOS by about 400 bytes, but this only affects the copy of DOS in memory. A fresh, unmodified copy of DOS is loaded into memory whenever you reset (Ctrl-Alt-Del), so you'll have to run Handicap.COM after you do a reset; you can do this by placing it in your Autoexec.BAT file.

Handicap.COM changes the shift keys so that they stay on for the next character you type. So if you push the left-hand shift key, the "a" key, and the "b" key, in that order, you'll see "Ab"; Handicap.COM turned off the shift key after you typed "a." This scheme works well for most keys, but there are two exceptions. The first has to do with using several shift keys in a row, as in Ctrl-Alt-Del. Handicap.COM watches to see if you have pushed another shift key, and it doesn't turn off any of the shifts until you hit some other key, not a shift key. If you hit the same shift key twice, though, Handicap.COM turns it off the second time.

The second case occurs when you use the Alt key in conjunction with the numeric keypad. The ROM BIOS subroutines allow you to enter a number by holding down the Alt key while you type the number of a character on the keypad, and this character appears when you release the Alt key. The Handicap.COM program recognizes when you are using the Alt key with the number keypad, and keeps the Alt key turned on until you push and then release the Alt key a second time. The character is sent when you release the Alt key for the second time.

Handicap.COM intercepts keyboard

```
10 DIM CHECK(14)
20 FOR I=1 TO 14 : CHECK(I) = 0 : NEXT I
30 PRINT "Checking";
40 FOR I=1 TO 14
50    FOR J=1 TO 8
60      READ BYTE
70      CHECK(I) = CHECK(I) XOR BYTE
80      CHECK = CHECK XOR BYTE
90    NEXT J
100   PRINT".";
110 NEXT I
120 PRINT
130 LINECHECK = 0
140 FOR I = 1 TO 14
150   READ CHECK
160   LINECHECK = LINECHECK XOR CHECK
170   IF CHECK(I) <> CHECK THEN PRINT "Data in Line";1000+10*(I-1);"may be bad."
180 NEXT I
190 'IF LINECHECK <> 117 THEN PRINT "Data bad in line 2010 or 2020."
200 OPEN "handicap.com" AS #1 LEN=1
210 FIELD #1,1 AS BYTE$
220 RESTORE : PRINT "Writing...";
230 FOR I=1 TO 108
240   READ BYTE : LSET BYTE$ = CHR$(BYTE) : PUT #1
250 NEXT I
260 CLOSE
270 PRINT : PRINT "HANDICAP.COM created"
280 END
1000  DATA      235,    69,     144,    0,      0,      0,      0,      30
1010  DATA      83,     80,     184,    64,     0,      142,    21c,    16e
1020  DATA      23,     0,      138,    30,     25,     0,      156,    46
1030  DATA      255,    30,     3,      1,      50,     6,      23,     0
1040  DATA      36,     15,     116,    19,     132,    6,      23,     0
1050  DATA      117,    25,     10,     219,    117,    9,      10,     6
1060  DATA      23,     0,      162,    23,     0,      235,    12,     128
1070  DATA      62,     25,     0,      0,      117,    5,      128,    38
1080  DATA      23,     0,      240,    88,     91,     31,     207,    30
1090  DATA      184,    0,      0,      142,    216,    250,    161,    36
1100  DATA      0,      46,     163,    3,      1,      161,    38,     0
1110  DATA      46,     163,    5,      1,      199,    6,      36,     0
1120  DATA      7,      1,      140,    14,     38,     0,      251,    186
1130  DATA      71,     1,      205,    39,     0,      0,      0,      0
2000  '
2010  DATA      32,     13,     40,     192,    217,    205,    197,    241
2020  DATA      42,     145,    8,      108,    227,    172
```

Figure 2: *The BASIC program GENHAND.BAS to build HANDICAP.COM*

interrupts so that *it* is in control, rather than the ROM BIOS subroutine, whenever you press or release any key. But to avoid repeating much of the work done by the ROM BIOS subroutine, Handicap.COM merely delays the call and does a small amount of work both before and after the ROM BIOS subroutine does its job. This is the magic behind Handicap.COM—it watches the bits for the four shift keys to see if they change between the time Handicap.COM calls the ROM BIOS subroutine and the time it receives control again, which occurs when the ROM BIOS subroutine issues a return.

Ordinarily, Handicap.COM turns a shift key back on whenever you release a shift key—that is, whenever the ROM BIOS subroutine changes a shift bit from 1 to 0. But when you push another key,

(continued)

```
VECTORS         SEGMENT AT 0H
        ORG     9H*4
KEYBOARD_INT_VECTOR     LABEL   DWORD
        ORG     16H*4
VECTORS         ENDS


;-------------------------------------------------------------------------;
; The keyboard flag contains the status of the various keys.  The lower ;
; four bits contain the shift flags:                                      ;
;                                                                         ;
;       --3--           --2--           --1--           --0--             ;
;      Alt key         Ctrl key       Left shift      Right shift         ;
;-------------------------------------------------------------------------;
ROM_BIOS_DATA   SEGMENT AT 40H
        ORG     17H
KB_FLAG         DB      ?
KB_FLAG_1       DB      ?
ALT_INPUT       DB      ?
ROM_BIOS_DATA   ENDS


CODE_SEG        SEGMENT
        ASSUME  CS:CODE_SEG
        ORG     100H
BEGIN:  JMP     INIT_VECTORS            ;Initialize vectors and attach to DOS

ROM_KEYBOARD_INT        DD              ;Address for ROM routine


;-------------------------------------------------------------------------;
; This procedures intercepts the keyboard interrupt and moves any new   ;
; characters to the internal, 80 character, buffer.                       ;
;-------------------------------------------------------------------------;
INTERCEPT_KEYBOARD_INT  PROC    NEAR
        ASSUME  DS:NOTHING
        PUSH    DS
        PUSH    BX
        PUSH    AX

        ASSUME  DS:ROM_BIOS_DATA        ;Read BIOS keyboard flags
        MOV     AX,ROM_BIOS_DATA
        MOV     DS,AX
        MOV     AL,KB_FLAG              ;Get flag before interrupt routine
        MOV     BL,ALT_INPUT            ;Keep track of old ALT_INPUT state

        PUSHF
        CALL    ROM_KEYBOARD_INT        ;Read scan code with BIOS routines
```

Figure 3: *The assembly language program, GENHAND.ASM. The output of this program can be used in GENHAND.BAS for those who do not hove an assembler.*

```
        XOR     AL,KB_FLAG              ;Did anything change?
        AND     AL,0FH                  ;Remove the upper four bits
        JE      NO_CHANGE_IN_FLAGS      ;Flags didn't change
                                        ;Flags did change, see if turned off
        TEST    AL,KB_FLAG
        JNZ     RETURN_FROM_INT         ;Flag turned on, no action needed
FLAG_TURNED_ON:                         ;Flag was turned off
        OR      BL,BL                   ;Were we in the ALT_INPUT state?
        JNZ     NO_CHANGE_IN_FLAGS      ;Yes, then turn off all flags
                                        ;No, then still in ALT_INPUT
        OR      AL,KB_FLAG              ;Turn flag back on until another key
        MOV     KB_FLAG,AL              ;  pushed.
        JMP     SHORT RETURN_FROM_INT   ;Continue on with program

NO_CHANGE_IN_FLAGS:                     ;Another key pushed, clear flags
        CMP     ALT_INPUT,0             ;  unless in ALT-INPUT state
        JNZ     RETURN_FROM_INT         ;Is in ALT-INPUT state, return
        AND     KB_FLAG,0F0H            ;Isn't, so reset shift flags

RETURN_FROM_INT:
        POP     AX
        POP     BX
        POP     DS
        IRET
INTERCEPT_KEYBOARD_INT  ENDP


;-------------------------------------------------------------------------;
; This procedure initializes the interupt vectors.                        ;
;-------------------------------------------------------------------------;
INIT_VECTORS    PROC    NEAR
        ASSUME  DS:VECTORS
        PUSH    DS                      ;Save old Data Segment
        MOV     AX,VECTORS              ;Set up the data segment for vectors
        MOV     DS,AX
        CLI                             ;Don't allow interrupts
        MOV     AX,KEYBOARD_INT_VECTOR  ;Save addresses of BIOS routines
        MOV     ROM_KEYBOARD_INT,AX
        MOV     AX,KEYBOARD_INT_VECTOR[2]
        MOV     ROM_KEYBOARD_INT[2],AX
                                        ;Set up new KEYBOARD_INT vector
        MOV     KEYBOARD_INT_VECTOR, OFFSET INTERCEPT_KEYBOARD_INT
        MOV     KEYBOARD_INT_VECTOR[2],CS
        STI                             ;Allow interrupts again

        MOV     DX,OFFSET INIT_VECTORS  ;End of resident portion
        INT     27H                     ;Terminate but stay resident
INIT_VECTORS    ENDP

CODE_SEG        ENDS

        END     BEGIN
```

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TOGGLING

Handicap.COM turns off all the shift keys *after* the ROM BIOS subroutine has placed a shifted character into the character buffer read by DOS. The shift key stays on for only one character.

In the case of consecutive shift key use, pushing and releasing the first shift key causes Handicap.COM to turn this shift key on again. When you push another shift key, Handicap.COM notices that it was a shift key, not a normal key, so it doesn't turn off the first shift. Handicap.COM allows you to turn on all four shift keys at the same time provided you don't push any shift key twice or any non-shift key. If you do either, Handicap.COM will turn off all four shifts.

Handicap.COM can go a long way toward helping handicapped PC users get the most out of their computers.

In the other special case, which involves using the Alt key and the numeric keypad together, the ROM BIOS subroutine uses an address in the lower part of memory, 419 hex, to store the character as it's being built from the digits. If you type Alt-3-5, memory location 419 contains 3 after you push the 3 key and 5 after you push the 5 key. Then 419 becomes 0 as soon as you release the Alt key. This means the memory location 419 is a non-zero number only when you are using the Alt and numeric keys to input a character. Handicap.COM watches this memory location, and if it is not zero, it doesn't change the shift bits.

This is Handicap.COM's complete bag of tricks. It is a fairly short and reasonably straightforward program, but it goes a long way in helping handicapped PC users get the most out of their computers. ■

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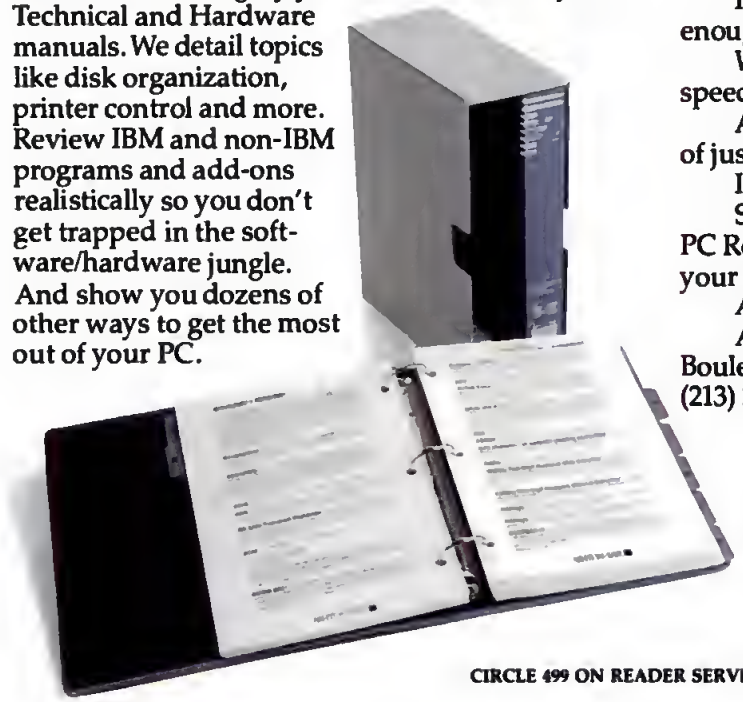

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Killing Clerical Doldrums

One of the most mundane office tasks has to be the preparation of mass mailings. Even a mailing to only 100 people represents a lot of work each time. And even typists who are speed demons quickly get bored.

Computers are well-suited to performing repetitive, mundane tasks. They never get bored. So it makes sense that one of the first things any office or group should computerize is its mailing list.

The three packages reviewed here represent the full range of currently available mailing list programs. Peachtree's *Mailing List Manager* is sold by Peachtree and by IBM as part of the IBM Professional Computing Series. The program lists for $250, but, if you wish, you can buy it as part of the $395 PeachText 5000 System, including *PeachText* Word Processor, *PeachCalc*, the *Random House Thesaurus*, *Peachtree Spelling Proofreader*, and of course, the *Mailing List Manager*.

Running a close second in performance is *Personal Mailer* by Computer Age of San Francisco. It packs in 90 percent of Peachtree's *List Manager* at one-third the price. Finally, *Name/Address Mailing* by McCullar Microcomputing is an inexpensive package that may be just right for the modest user.

Peachtree's *Mailing List Manager* is by far the slickest of the lot. The packaging is typical IBM, well-organized and easy to read. Almost half the manual is an eight-chapter tutorial. I like tutorials; they avoid a lot of theoretical chatter and let the user dive in, one of the quickest ways to really learn this computer stuff. The keystrokes required are printed in green and stand out from the text, so experienced users can

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CIRCLE 705 ON READER SERVICE CARD

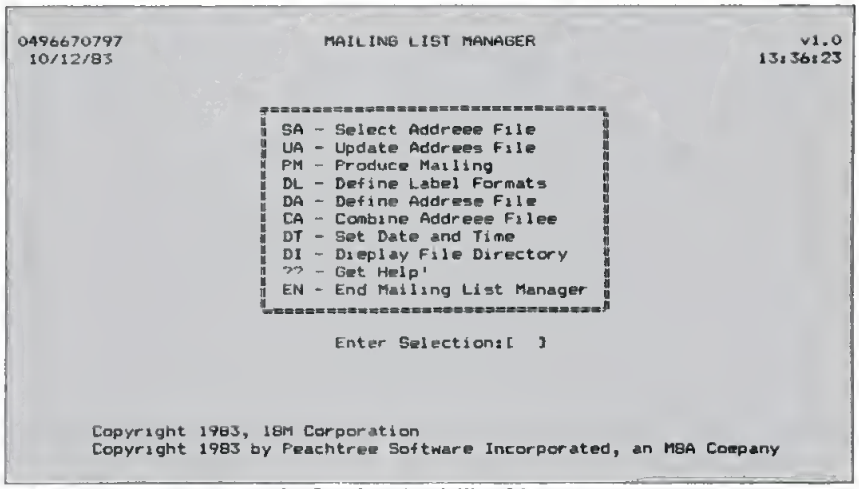

Figure 1: *The opening menu for Peachtree's* Mailing List Manager.

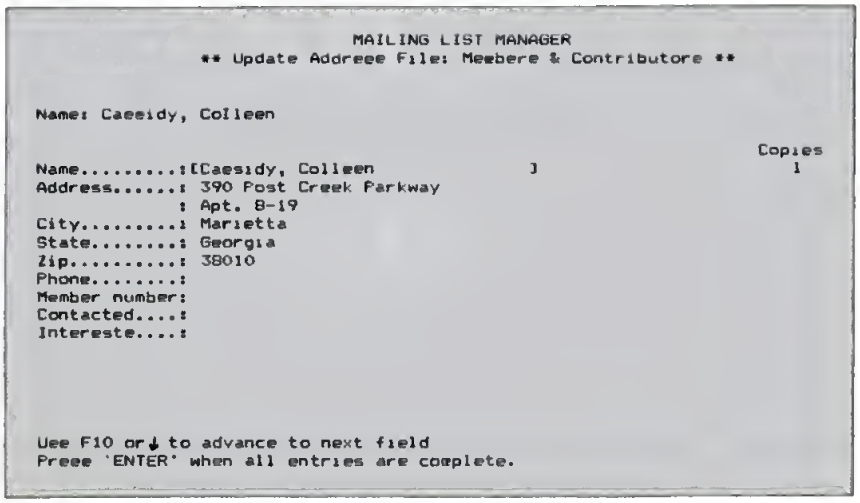

Figure 2: *Entering names in* Mailing List Manager.

enter the data, watch their screens, and learn practically everything they need to know without having to read the text between the lines. It takes about 2 hours to go through the tutorial, and it's well worth the time. It moves along at a steady clip and provides a comfortable mastery of the program. Finally, it is also fairly easy to reference.

Entering names into *Mailing List Manager* is easy. The opening menu will look familiar to *PeachText* users; to select any of the menu choices, you type in the two-letter code that represents that choice (see Figure 1). *Mailing List Manager* also makes extensive use of preset values, so you can respond to many prompts simply by pressing the Enter key. You can use either the function keys or the numeric keypad for moving the cursor around.

Defining An Address File

The first step in setting up *Mailing List Manager* is to define an address file. You can define up to 14 different items of up to 76 characters each. After you define each item by giving it a name and indicating its length, you are asked to show which fields you want your records to be indexed on. *Mailing List Manager* creates separate files for each index. Searching files with these indexes is fast, as they are always kept in indexed order and don't have to be sorted each time you process them. The last step in defining an address file is reserving disk space for it. The manual suggests that you reserve the entire disk, and indeed you should; who knows exactly how many records are going to be in a file? But once you have reserved the disk, you can't change your mind. If you do, it's tough luck.

Once you've defined what your address file is going to look like, you're ready to enter names (see Figure 2). (I found it hard to adjust to pressing the down arrow or F10 key after entering each item; I was used to pressing the Enter key. Fortunately, if you do press the Enter key it's just a couple of keystrokes to get back to where

you were.) You can set assumed values; for example, enter the city name and it will automatically insert it for you until you change the assumed value for that field.

Finding records within a file is a snap, and you don't have to be exact about spelling.

Finding records within a file is a snap, and you don't have to be exact about spelling. *Mailing List Manager* finds the closest possible match and you can start scrolling through the file from that point, though you can only move one record forward or backward at a time. You can search for records with any of the three indexes.

So far, you say, so what? But there's more here than meets the eye. One of the menu choices looks unassuming enough: CA for "Combine Address Files." But what you can do with this feature is truly amazing—merge records from one file into another file with a different format. For example, you may have one mailing list that contains name, address, and phone number for each customer, and a second file that contains a list of names and phone numbers only. With this feature you can easily add all the names and phone numbers in the first file to the second file.

It gets better. The most exciting menu feature by far is "Define Label" (DL). Under this option, you create and store formats for the mailing you will be printing out. First you define a label with a verbal description, including the number of lines and the width. If you have an IBM or Epson printer, you can choose which font you want to use from a set menu of choices.

Now the fun part. A blank label is drawn on the screen for you, and you can position each item where you want it on the label (see Figure 3). A "Test Print" option allows you to send your mock-up to the printer. If you don't like the looks of it, or if the addresses don't print exactly where the labels will be, it's easy to reposition items. The possibilities are limitless. Not only can you print out traditional mailing labels, you can also print lists of names with phone numbers only, lists of products with quantity and product numbers, lists of zip codes with purchase categories. . . . Once you start using *Mailing List Manager*, you'll think of all sorts of applications for it. You won't be able to avoid coming up with new ideas.

Finishing Touches

Once a label format has been defined, the "Produce Mailing" option allows you to print out your file of names in the format you've designed (see Figure 4). You can choose three different fields to have *Mailing List Manager* sort on, in ascending or descending order. You can choose to "Reverse halves at comma" on an item: You can enter a name with the last name first for indexing purposes but print it out first name first, without creating a separate field for the first name.

The last step is to define the mailing profile. The default profile will "Include all records," but you can direct the program to print out only parts of your mailing list. You build statements phrase by phrase; for example, you can tell the program to:

Include all records for which
Name equals or is greater than B
and Name is less than G
and Zip equals 60606.

Now you're ready to print out labels. With the variety of options available, it should be a snap to make the snazziest labels around.

While *Mailing List Manager* has some flashy features, *Personal Mailer* is, in my opinion, the best for the money. It does just about everything the Peachtree package can do, except combine two different files. And it does something that Peachtree's package cannot do: It converts the data you've entered into comma-delimited ASCII files that you can use with almost any word processing package. You can use *Personal Mailer* to create and print out mailing lists, and use *WordStar* with *MailMerge* to write form letters. In my book, this feature makes the package worth a million by providing the kind of flexibility that all software packages will eventually need to have. Incompatibility among packages is a chronic problem that contributes significantly to computerphobia, and I predict that smart software companies will begin to create products that can

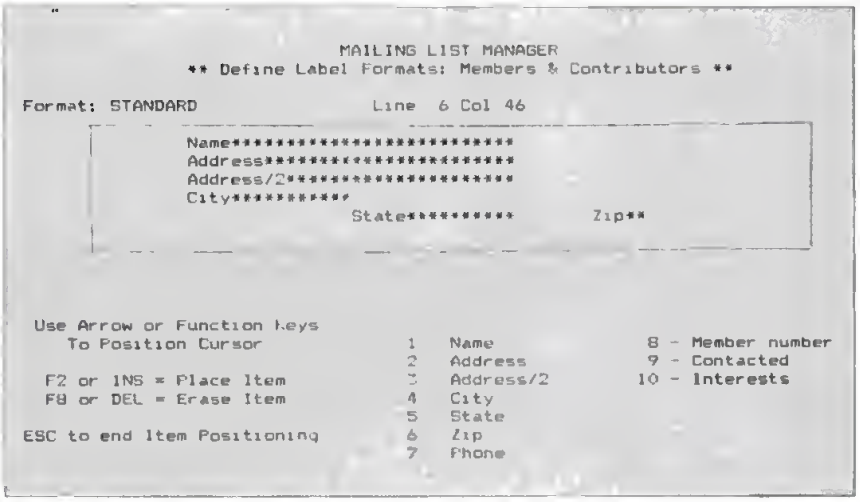

Figure 3: Mailing List Manager *lets you position mailing label elements exactly where you want them.*

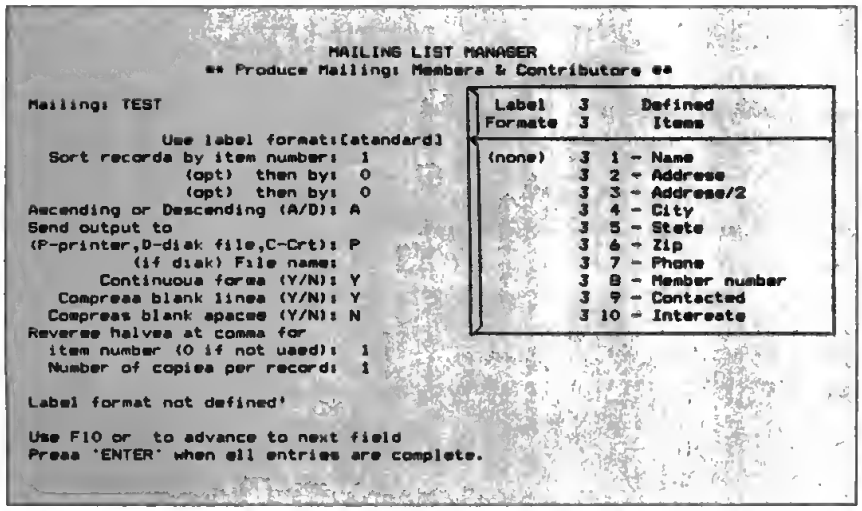

Figure 4: *The "Produce Mailing" menu from* Mailing List Manager.

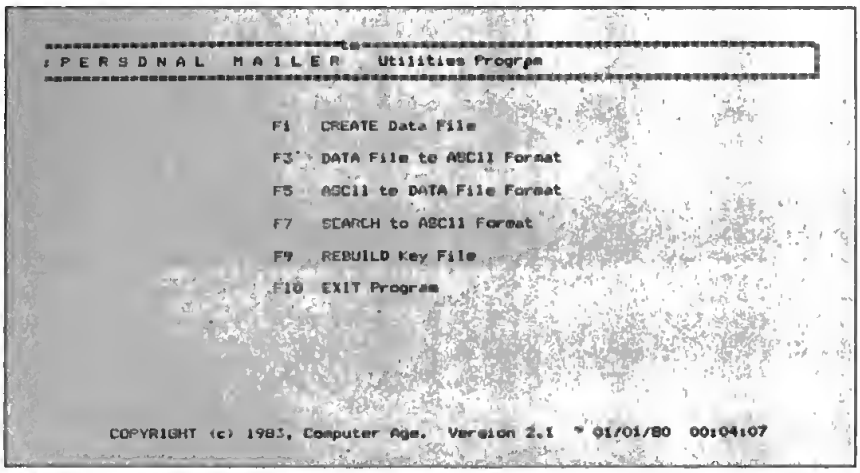

Figure 5: Personal Mailer*'s Utility Program menu.*

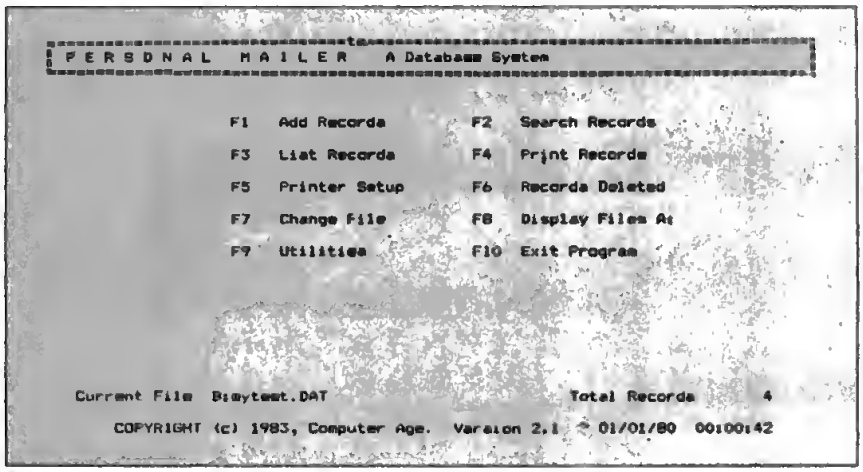

Figure 6: Personal Mailer*'s main menu.*

be used with all kinds of packages, even those manufactured by other sources.

Personal Mailer consists of two main segments that are interactive. The Utility segment allows you to set up your initial file, change the length of the records, convert your files to ASCII format, sort the file, and write the sorted file to ASCII format (see Figure 5). The menu requires you to press one of the function keys to choose an option. Filename prompts appear; other prompts require only a single keystroke. Setting up a file is easy. You can define up to 11 items, each up to 68 characters long. You can choose the name and length for each field or choose *Personal Mailer*'s defaults by pressing the Enter key, use some combination of the two.

Personal Mailer's Features

The second segment, called "A Database System," is where the rest of the work gets done (see Figure 6). As in the utility segment, menu items are selected by pressing one of the function keys. Entering names in the file you've just created is easy, and full edit capabilities are available. What's more, the edit keys and their functions appear in a line across the bottom of the screen. At first I found this line hard to read, but once I had looked up what each item meant, it served as a good reminder. This built-in reminder line shows real consideration for the user and is one reason why the hard-to-read documentation doesn't detract from the overall usefulness of the package.

Searching for records is easy and can be performed on any data field. If, for example, you can't remember the name of a record you want to see, but you know the address was in Akron, Ohio, you can tell *Personal Mailer* to search the field you've designated as "city." You're then asked for the name you want to search for. You can enter "A" or "Akr" or "Akron," and the program will show the record for the first occurrence of whatever field you're selected. You can then browse through the records until you find the one you want. There are a few different types

of searches possible, including "search for everything except this word" or "search across every field of every record for this word." The latter option could be especially useful for bibliographic searches.

Personal Mailer lets you define your mailing format, and while the screen is not as attractive as *Mailing List Manager*'s, the program has the same degree of flexibility. You can place any item anywhere you want, and positioning is done visually. You can select any of the items from your records and print the combination you desire.

You cannot choose from a predetermined menu of printer fonts, but you can send your own control codes to the printer prior to printing. I personally prefer this option because it's possible to choose from the entire range of available fonts. You may choose to print out either entire records or a partial range. Labels may be printed 1, 2, or 3 across. You define everything about your records and what they'll look like at printout time.

Low Budget Lists

If your needs are simple and your budget modest, *Name/Address Mailing* may be the package for you. It does not have the flexibility in data field definition or label-format design that make other packages mini-data base managers, but it produces mailing labels easily and offers limited sorting capabilities.

Documentation is a lá IBM in format and size, but it's all done on a dot matrix printer. As a big dot matrix fan, I appreciate the care that's gone into this production. No tutorial is provided, but the beginner will have no trouble getting it up and running in minutes.

Entering names is easy. The items are named for you and not only include all pertinent address information, but provide for additional coding as well. Records can only be searched by customer number, but a sort can be done by name and zip so that you can print out alphabetical lists from which to find customer numbers.

The printout is standard label format with a choice of printing 1 or 2 across. Blank entries, like an unused second address line, produce blank lines on the label, a feature I don't fancy.

The program, written in BASIC, might be fun to play with. If your mailing list needs are simple, this one's for you. ■

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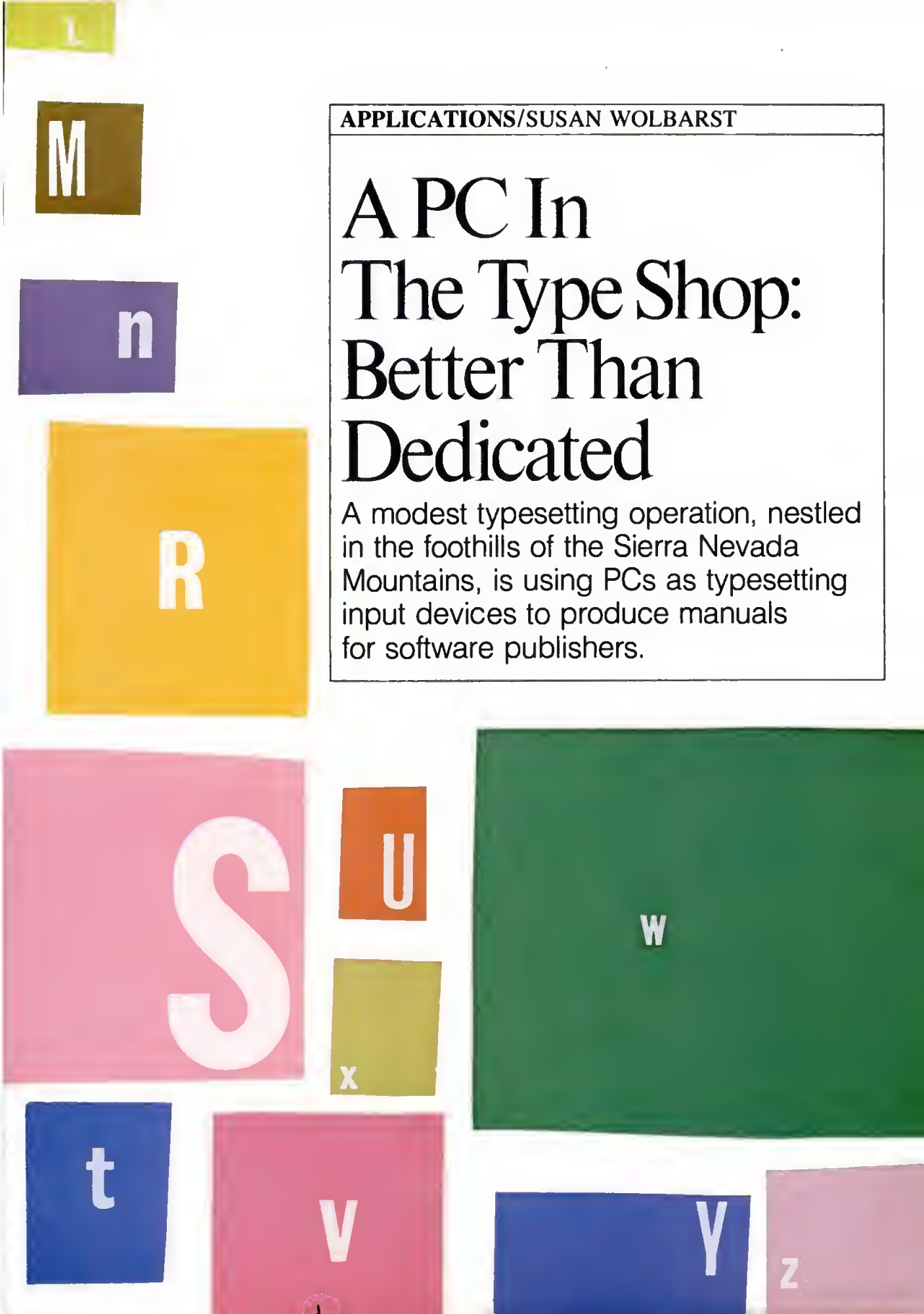

APPLICATIONS/SUSAN WOLBARST

A PC In The Type Shop: Better Than Dedicated

A modest typesetting operation, nestled in the foothills of the Sierra Nevada Mountains, is using PCs as typesetting input devices to produce manuals for software publishers.

About an hour and a half north of Sacramento, at the foothills of the Sierra Nevada mountains, lies Nevada City, California, a picturesque town with a population of 3,000 and gingerbread-style houses left over from its settlement during the California Gold Rush in 1848. Nevada City relies on its charm and history to lure tourists, who provide its bread and butter.

On one side of the town, however, is a low-key computer typesetting business, housed in a rickety four-story building. It is Dwan Typography, a business that relies on IBM PCs, not tourists, for capital. Operated by Rebecca and Kevin Dwan, the company designs and typesets the documentary manuals that accompany computer programs, as well as books.

Attracted by the Sierra foothills, the pine trees, and the quiet, the Dwans set up shop in Nevada City in 1976, combining Rebecca's expertise in printing and four-color process work and Kevin's in editing and writing.

When they started their business, the Dwans purchased a dedicated typesetting system, the Mergenthaler MPV. The system, which cost $18,000, ran under Mergenthaler software and read only Mergenthaler disks. As customers submitted manuscripts, they were keyed into the system, using its one entry station. The disks were then processed by the machine into typeset galleys.

Initially the Dwans produced business forms, advertising, and other small-sized printing tasks. Later, they moved into book publishing, typesetting scholarly texts and contemporary works of literature for the University of California Press.

Dedicated Alternatives

Although the dedicated system functioned adequately, the Dwans began to find it limiting. Their $18,000 had bought them only one entry station, and, as their business picked up, this was no longer sufficient. Adding another station would be too expensive for their modest operation; furthermore, the added terminal would function only in tandem with the whole system, so if a crash occurred on that terminal, the entire system would crash. "The dedicated machine was *too* dedicated," says Kevin. "It simply didn't offer enough flexibility."

The Dwans' goal was to produce well-designed, professionally typeset manuals unlike the Xerox-quality, hurriedly produced ones most of us are so familiar with.

In 1979, looking for alternatives, the Dwans bought their first microcomputer, the Altos 8000-5, a Z-80 machine running under CP/M and MP-M. This decision changed their business in two ways: it led them to abandon the dedicated typesetting system entirely, and it introduced them to a brand-new market—producing manuals for computer programs.

With the arrival of their first microcomputer, the Dwans began using computer manuals, including the manual by Digital Research for the CP/M-86 operating system. "It struck us that there was a lively market for professionally typeset manuals," says Kevin. "We made what sales people call a cold call—I don't know you, and you don't know me—on Digital Research in Pacific Grove, California, and told them that we could work with their data on disk. We described our history with publishers, which apparently impressed them. Our first major project for DR was the manual for C/PM-86 for the IBM PC. They began working with us then, and have been with us ever since."

The Dwans' goal was to produce well-designed, professionally typeset manuals unlike the Xerox-quality, hurriedly produced ones most of us are so familiar with. Says Kevin, "Software publishers consider professionally prepared manuals an afterthought. They find themselves only 2 weeks away from a deadline, they have hassled with their programmers and editors for 6 months, and they want an instant book."

The PC's Appearance

Dwan typography had a new mission: its primary focus now was to produce manuals for software publishers. The production process could no longer withstand the limitations of the dedicated typesetter, so they sold the Mergenthaler system and bought two IBM PCs. They chose the PC because of IBM's reputation and because of the ergonomics of its screen and keyboard. But the most significant factor was that many utility programs were available for the PC. With such programs, the PC can read disks from Kaypro, Osborne, Televideo, and many other manufacturers, in addition to its own. The Altos 8000-5 didn't offer these capabilities.

Dwan Typography now had three data entry terminals, so three operators could work independently and simultaneously, each backing up his own data. Furthermore, the company was no longer limited to the inflexible dedicated software, which allowed for little variation in text format-

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ting. For PC-compatible software, the Dwans contacted a programmer by the name of Jeremy Griffith, who had written typesetting programs for dedicated machines. He agreed with the Dwans that such programs were not the best solution to the basic tasks a typesetter faces from day to day. They chose a text editor called *Omni*, written by Griffith himself. He then custom designed a series of programs written in assembly language for the PC's 8088 processor under CP/M-86, Concurrent CP/M-86, and PC-DOS. In addition, the Dwans used a number of on-the-shelf software packages.

Producing the Manuals

Dwan Typography takes painstaking care in designing and producing its manuals, a fact that distinguishes its products from those produced by software companies. The process begins when a customer submits a manuscript on a 5¼- or 8-inch disk. If the customer desires, the Dwans will design the manual, typeset it, and do page makeup, but some customers require only typeset galleys as a final product, while others who own printing equipment want only a formatted disk.

Once the customer's requirements have been established, the next step is to revise the standard software programs to replace the existing print formatting, dot commands, or special patterns in the customer's disk with the appropriate typesetting commands. Some of the conversions are quite complex, but all are within the PC's capabilities. The Dwans are now able to offer their customers a greater number of design alternatives, because making the necessary conversions is simple with the PC. "Dedicated front-end typesetting systems, because they are not flexible computing tools, frequently have difficulty in making the complex conversions necessary," Kevin says.

Many typesetters using the traditional equipment ask customers to enter pseudocode to indicate changes in type styles and sizes. This system is designed to allow for easy and efficient substitution of typesetting code, but the Dwans don't use it. "The pseudocode approach does not save the customer a significant amount of money, and if the customer makes even minor mistakes in entering the code, the results can be disastrously expensive," explains Kevin. The PC performs this task more efficiently using a complex search-and-replace operation. "The ability to do a complex search-and-replace operation on a $4,000 PC is beyond the capability of dedicated typesetting equipment costing ten times as much," Kevin adds.

A complex search-and-replace operation on a PC is beyond the capability of dedicated typesetting equipment costing ten times as much.

Although, technically, editing and proofreading have been done before the Dwans receive the manuscript on disk, they are quick to spot and correct typos. If they encounter a significant problem during any stage of production, they pick up the phone and call the customer. Their goal is to produce a perfect product.

The formatted disks are then processed through typesetting output devices. Currently, this operation is not taking place in-house, although the Dwans plan to move in this direction. The final step, if the customer has requested it, is page makeup. The entire process takes about a week, but frequently the company accommodates customers needing ovemight jobs, without compromising the quality of the job.

Rebecca sums up the company's successful conversion to microcomputers: "Up until now, micro applications as art have been rather crude. We finally made that marriage. The output that we do is state-of-the-art typesetting. Control of design elements such as kerning (adjustment of space between characters) and hyphenation is enhanced, not sacrificed, by using the PC. We can do as much of that artsy stuff as people want; ours is a tailored automatic process."

Using the PC as a typesetting input device has brought a speed and flexibility to Dwan Typography that never would have been possible with the dedicated equipment. The operation, for the most part, runs smoothly, though Kevin does have one complaint. "We use many different applications packages, which run under various operating systems. Occasionally, when we switch operating systems to run a different program, the function keys are rendered useless. You have to boot again and wait about 20 seconds—a minor annoyance, not a major bug."

Currently in the works at Dwan Typography is a manual for Digital Research's new computer language for young high-school students, Dr. LOGO. Digital Research apparently is pleased with the high-quality manuals produced by this modest typesetting outfit with its PC operation. If all software publishers could turn to Dwan Typography, computer program documentation might begin to gain a better reputation. ■

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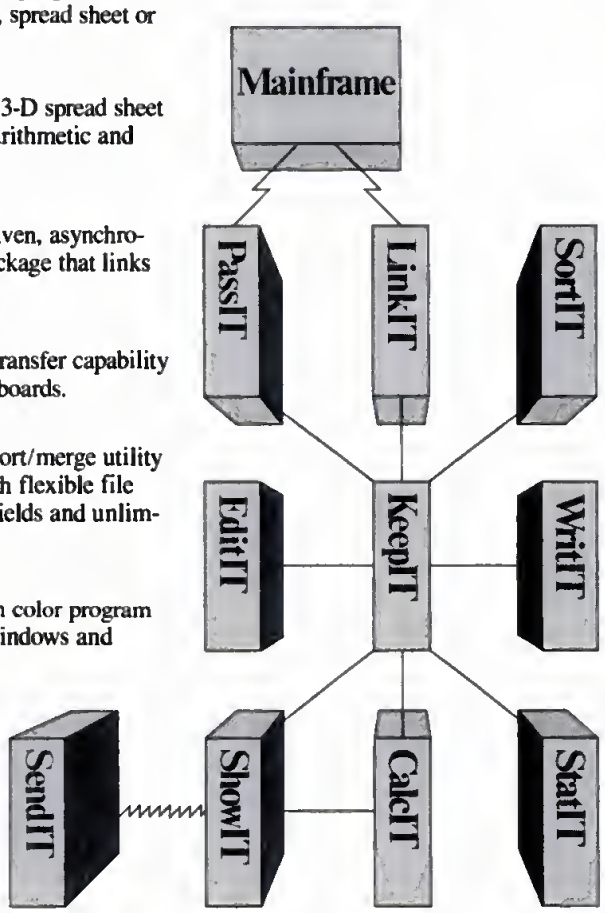

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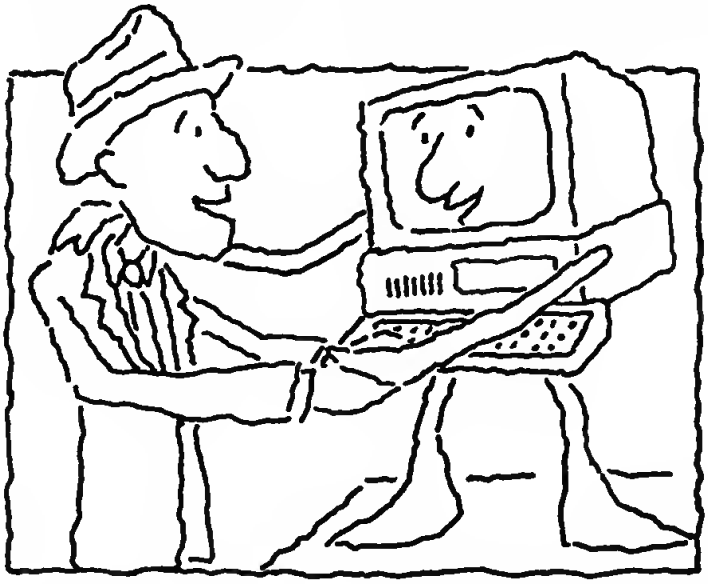

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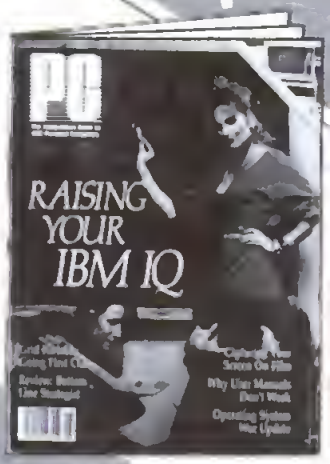

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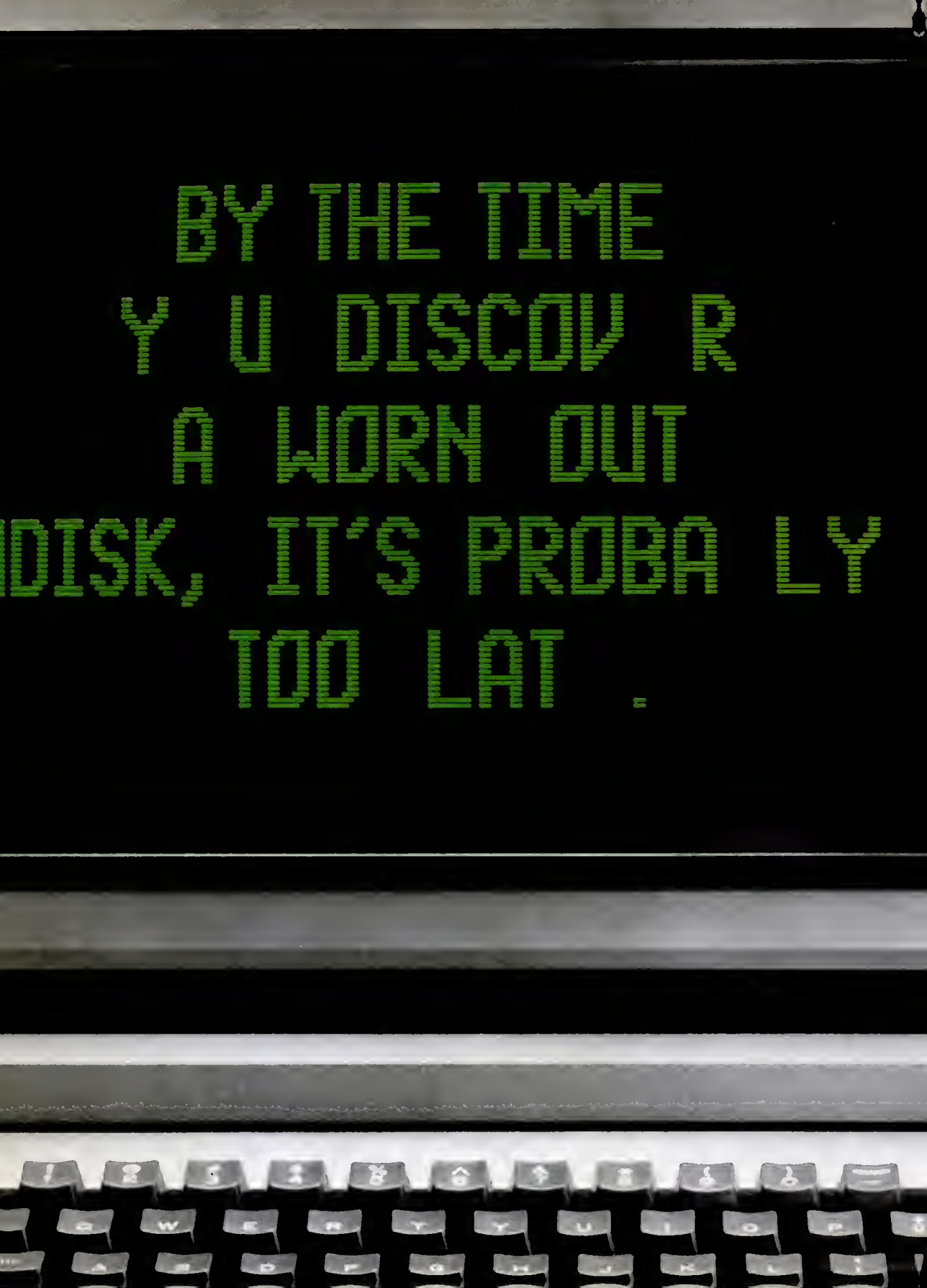
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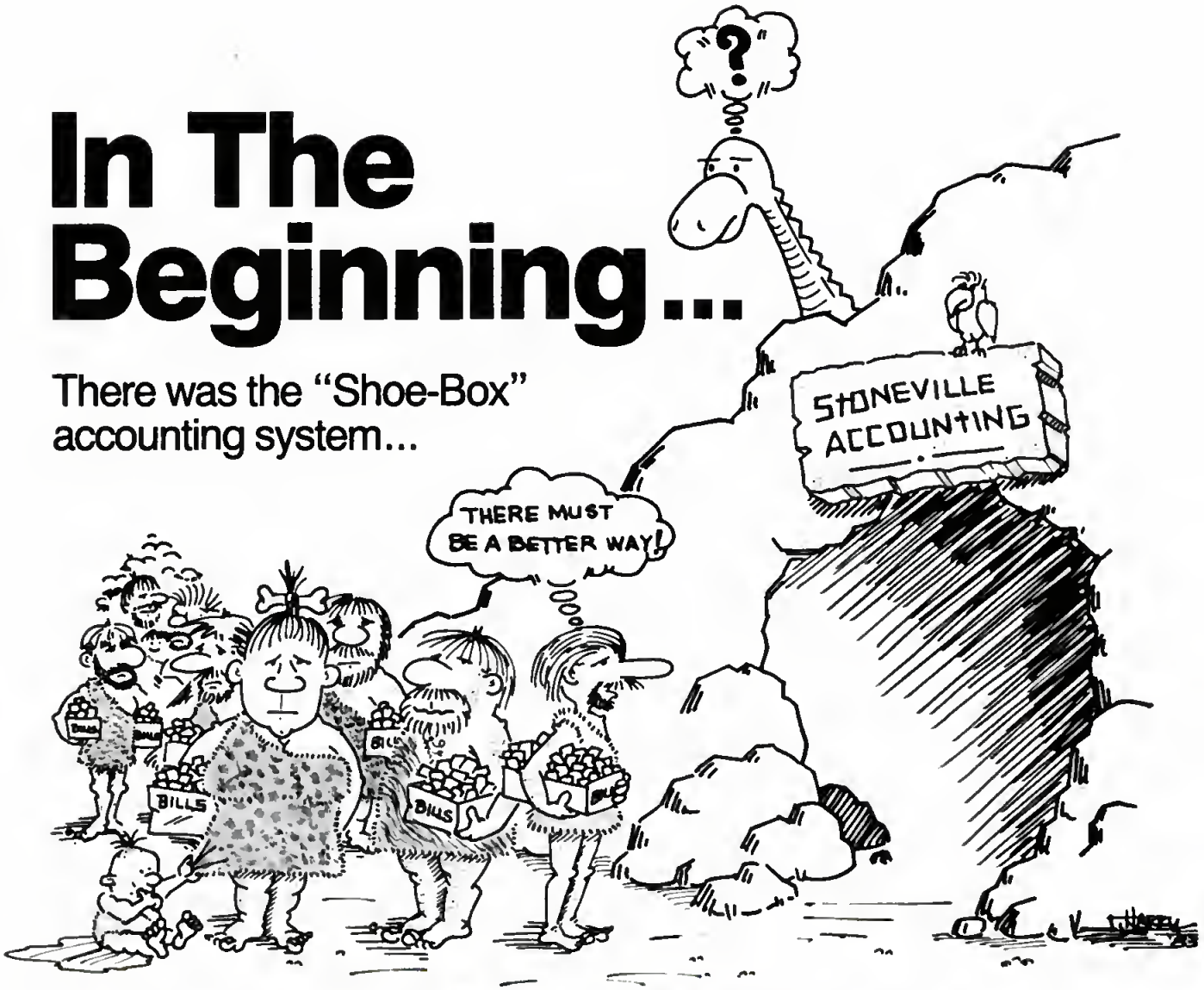

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CIRCLE 486 ON READER SERVICE CARD

Doing Business With BASIC

Business BASIC may not be known as widely as Microsoft BASIC, but this easy-to-program language is used to develop commercial applications on the IBM PC.

Many of you may have heard the story of how Microsoft's BASIC came into being. An interpreter was designed and the language was implemented on an Altair, the granddaddy of personal computers, over the course of only a few weeks. Since then, this version of BASIC has become available on dozens of computers and is now almost synonymous with the IBM PC.

BI-286
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Portland, OR 97221
(503) 297-7153
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CIRCLE 800 ON READER SERVICE CARD

What you may not know, however, is that an earlier BASIC interpreter was developed for the Altair, resulting in an implementation called Business BASIC. It was originally developed by a company called BASIC Four for its series of minicomputers and has since migrated to other minicomputers such as the IBM Series/1 and the DEC PDP-11. It first came to the microcomputer world on multiuser systems based on the Motorola 68000 (for example, Pixel and Wicat), Zilog Z8000 (Zilog) and the PC's older cousin, the Intel 8086 (Rexon and Mercator). It is now available on the IBM PC from a company called Control-C Software, in Portland, Oregon, under the name BI-286. This version, designed for single use, deserves serious attention from programmers interested in business applications.

Strictly Business

So just what is Business BASIC? Well, first and foremost it is the language BASIC, a descendent of the original version, which was developed at Dartmouth College, in New Hampshire. However, it is strictly business oriented and aims to solve commercial problems in the simplest way possible. It succeeds magnificently. Originally Business BASIC was designed for multiple-user systems, and features such as file and record locking convey this origin. Until Business BASIC was written to run on MS-DOS and CP/M systems, all implementations were written for systems that accommodate more than one user.

(continued)

Although some of its multiuser features may be unnecessary in the PC version, this capacity offers a significant benefit. If you have PC software written in Business BASIC, it can be moved onto multiuser systems with a minimum of conversion.

And I do mean a minimum. One of the oddities of Business BASIC is that versions from different manufacturers are tremendously compatible. BASIC Four may have developed it, but the companies that have written their own versions have followed the original closely. Most likely, these companies had an interest in BASIC Four's customer base, but, whatever their reasons, I find this compatibility remarkable. If you look at the implementations of BASIC from Microsoft, Atari, Texas Instruments, and Digital Research, you will be left wondering just what BASIC is, because each of these versions is so different. Business BASIC offers one of the most programmer-friendly features of all: You can easily transport your code to a number of other machines. I'm sure plenty of Osborne users would love this transportability now.

I'm sure plenty of Osborne users would love this transportability now.

A Business BASIC Program.

Programming in Business BASIC is straightforward and efficient. Here's a short program for inputting names and addresses.

The program below will let you input a name and address, write it to a keyed disk file, and then log it to a printer. The mnemonic 'FF' does a form feed on the printer; @(40) tabs to column 40 on the printer. The ERRor trap on the input statements will go to line 1000 if input longer than the LENgth specified is entered. 'CS' clears the screen, and 'CL' will clear only the current line. INPUT * will ignore the value entered and just wait for a RETURN. RETRY retries the statement in error. WRITE . . . KEY=A$ writes to a keyed file using the name input. Note that you do not need to LSET, RSET, or FIELD anything; you simply specify a list of variables to be written out to our disk file.

```
  10 REM 'This is a short Business Basic Program
  20 PRINT 'CS'
  30 OPEN (1)"OUTPUT",(2)"LP"
  35 PRINT (2) 'FF',"Name",@(40),"Address",'LF'
  40 INPUT (0,ERR=1000)@(10,10),"Name: ",A$:(LEN=20)
  50 IF A$="" END
  60 INPUT (0,ERR=1000)@(10,11),"Address: ",B$:(LEN=30)
  70 PRINT (2) A$,@(40),B$
  80 WRITE (1,KEY=A$)A$,B$
  99 GOTO 40
1000 PRINT @(0,23),'CL',"Input is too long -- reenter"
1010 INPUT *
1099 RETRY
9999 END
```

Easy Programming

Business BASIC offers a number of features designed to make programming easy. It uses Binary Coded Decimal (BCD) arithmetic, which means you do not have to wrestle with integer, single, and double-precision numbers. (Nor do you have to read on the front page of the *Wall Street Journal* that your computer has trouble with division.) BCD arithmetic means that your computer does all its work in base 10, as most people do. This is particularly easy on the IBM PC, since its 8088 processor has special instructions for BCD arithmetic. Any number can be up to 14 digits long and include seven decimal places. In Business BASIC you can specify at any time how many decimal places you want to use. Two is normal. You would issue the command PRECISION 2 to your computer, which means that all calculations will be automatically rounded to two decimal places (for example, 2.23 * 1.5 = 3.35).

A far more important feature of Business BASIC is keyed file support, which allows you to use strings for keys. For example, you can write out records using names, addresses, and dates for keys. Microsoft BASIC does not offer this support, nor do such languages as C and Pascal. While it is true that you can write a set of routines to support keyed files, the reality is that very few programmers are capable of or even interested in doing so. Applications programmers want to develop applications, not build their own tools. They believe, quite rightfully, that the people who develop language compilers and interpreters should provide the means to solve the problems encountered on a day-to-day basis. In business applications keyed files are particularly important. Although some businesses might claim that customers can be accessed by customer numbers, this isn't practical. You need

names and addresses to get at information, because most business customers don't know what number you have assigned them and won't take the time to learn. Some of the commercial applications available on the PC don't need keyed files (word processors and spreadsheets, for instance), while others rely heavily upon your ability to use numbers for access. Numbers are the only way to get into random files, but Business BASIC's keyed files allow you to access data in ways that people normally want to. They also provide more speed and flexibility, which is increasingly important as sorting becomes a thing of the past in most applications.

These powerful features, are essential to all versions of Business BASIC. Versions that cover only these features are usually called "BBII compatible," in reference to BASIC Four's level 2 version. This rather simple implementation has been largely replaced by the more powerful 'BBIII compatible' versions, which include additional features.

One additional feature of Business BASIC is the EXECUTE command. One of the frustrations of BASIC is its inability to issue commands such as GOSUB X or GOTO X. Business BASIC can't do this either, but its enormously powerful EXECUTE command serves the same purpose. It takes a string (for example, EXECUTE X$), which, if numbered, is treated as a line of code or, otherwise, as a direct command. For example, you can say EXECUTE "GOTO"+X$, where X$ is a line number. The EXECUTE command also lets you build lines of code inside of a program, which brings me to another useful facet of Business BASIC. It allows you to add or delete lines of code and change variables without having to start over again. This is not only useful for debugging or for continuing programming after an error, it also lets the EXECUTE command build code for you inside your program.

Another powerful feature of Business BASIC is called public programming, which lets you CALL other BASIC routines that are not part of your program. These routines are written in BASIC, not machine language, and can be stored in the computer's memory. This means that common code, such as screen editors or date checks, can be placed into a single module and doesn't have to appear in every program you write. So why not use the CHAIN command to join the programs? Well, first of all you have to get back to your original program. Provided you know where you came from and how to get back, this isn't so bad. But if you want to go back to the next line, how do you do it? In Business BASIC the CALL command will serve the same purpose or you could EXECUTE "GOTO"+STR(X+1), where X is the last line you were on. Note that Business BASIC does not require you to GOTO lines that actually exist. For instance, if you GOTO 1000 and 1000 is not an actual line number, Business BASIC will find the next line and continue from there. This is very useful, especially if you delete lines that are referenced elsewhere. Finally, if you CALL a routine, its internal variables are local, and will not interfere with those in your programs. This feature is totally lacking in most versions of BASIC, where all variables have a universal nature.

Business BASIC does not support graphics commands such as PAINT, CIRCLE, or DRAW.

Mixed Blessings

While Business BASIC has all of these ease-of-programming features, it also comes with a number of mixed blessings. The first is that variable names are limited to one letter and one number (for example, V, A0$, Q(2)). Although this may seem terribly restrictive, it prevents you from getting lost in a sea of similar names. If you try to use mnemonic names, you run the danger of names that are truncated to the same end result! Since Microsoft BASIC limits you to 255 character lines (Business BASIC is very forgiving in this regard—you can have 64K characters in a line or in a variable. For example, DIM X$(50000) is OK!

The second mixed blessing is that Business BASIC does not support string arrays. If you enter DIM X$(100) you get a string of 100 spaces called X$, which may not be so bad. It means MID$, LEFT$, and RIGHT$ are unnecessary. The string X$(10,10) means the same as MID$(X$,10,10) in Microsoft. This economy is a practical advantage, and, overall, it outweighs the use of string arrays, which can be easily mimicked. It is also possible to use a string expression such as X$(10,10)="ABCDEFGHIJ".

Business BASIC is also missing some things. Some, such as natural logarithms and hyperbolic cosines, are no great loss for commercial users. In fact, they are useless clutter. Other omissions are more significant, though. The language does not support graphics commands such as PAINT, CIRCLE, or DRAW. These features were not widely available when Business BASIC was created. Microsoft does an excellent job with these graphics commands, but, in any event, they are not essential to business applications. On the other hand, Business BASIC does provide better control of the monochrome monitor. It uses mnemonic codes for screen control 'CS' clears the screen and @(X,Y) positions the cursor to column X and row Y. (CLS and POSITION are the corresponding Microsoft commands.) Business BASIC uses the following additional codes: 'LD' deletes a line and rolls the screen, 'LI' inserts a line, 'SB' goes into low intensity, and 'SF' goes into high intensity.

Since Business BASIC was intended to be a complete system and since a multius-

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CIRCLE 222 ON READER SERVICE CARD

er environment with memory management means you have no idea where your task is, this version of the language has no PEEK and POKE command. I wish it did. However, this omission is at most only an irritant. Business programs should have no need of peeks and pokes.

BI-286

BI-286, the PC version of Business BASIC, is the only interpreter that was available as I wrote this article, though others are expected soon. It is available to run under MS-DOS, C/PM-86, MP/M-86, MP/M, C/PM, and Turbodos. As far as I know, all versions are 100 percent compatible. BI-286 is a solid product, and it functions as documented. The manual is quite clear and you could learn Business BASIC from it, which is fortunate since I know of no book that is available on the subject. I suggest, however, that you learn something about BASIC first, if you aren't familiar with it already. Business BASIC does share many features such as PRINT, INPUT, LET, GOSUB, GOTO, FOR . . . NEXT, and so forth with all versions of BASIC, and it, too, uses line numbers for control.

BI-286 supports keyed files without any trouble. Up to 15 files, plus the keyboard, may be OPENed at once. This is adequate for almost any application. It has the standard BCD arithmetic and string handling. It also supports the E key—a useful feature that can be used to do such things as terminate a program or ask for HELP whenever you want. Unfortunately, BI-286 is compatible only with BBII and therefore does not support commands such as EXECUTE and CALL. This is a bit disappointing, especially since this product has been around for awhile.

As I noted earlier, BI-286 is a single-user version of Business BASIC. It does not support a second terminal, although it is compatible with versions designed for multiple users.

BI-286 has several severe shortcomings. Clearly it was ported over to MS-DOS in a hurry to hop on the IBM PC

bandwagon, and the rush job shows. It does not support any of the ten function keys or the cursor control keys. Nor can it access a serial port. Business BASIC usually allows you to OPEN serial ports for I/O without any trouble (for example, OPEN(1)"T2"). Business BASIC usually allows at least one task to be run that does not need to communicate with the terminal screen, which is called a background task. If you have a background task, you can swap it in or out with your main task (similar to the capabilities of Concurrent CP/M). BI-286 does not support this very useful feature. It also bas no color support (you get white on black) or graphics. Overall, the PC version of Business BASIC is a bit of a disappointment and doesn't take advantage of the PC's capabilities. Oh well, the original version of *WordStar* for the PC wasn't great, either. Nonetheless, BI-286 does do what it says it will and is a good introduction to Business BASIC, until other versions reach the marketplace.

Coming Soon

A company called Standard Software announced a BBIII compatible interpreter some time ago, but as of October 1, it was not available. This company has also announced a compiled version, which, as far as I know, will be the first version of compiled Business BASIC.

Also upcoming for the PC is a version from Science Management Corporation, the leader in Business BASIC. SMC BASIC will be BBIII compatible and will also run on an IBM Series/I, the DEC PDP-11 and numerous UNIX-based systems. If its PC version is as good as its previous efforts, this product will be well worth waiting for.

Business BASIC has only minor faults; the main ones are graphics and color. You will have to stick to good old Microsoft BASIC for these, but if you want the finest language ever developed for commercial uses, one that allows you to develop applications as fast and as easily as possible, Business BASIC is the winner. ■

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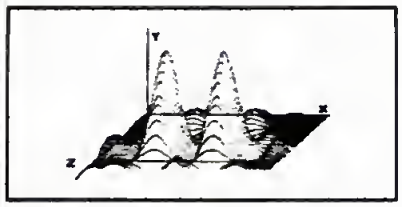

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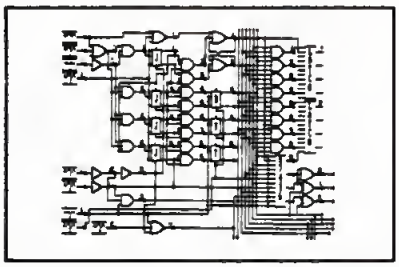

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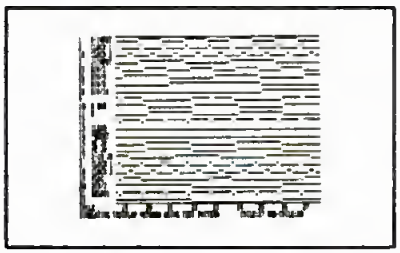

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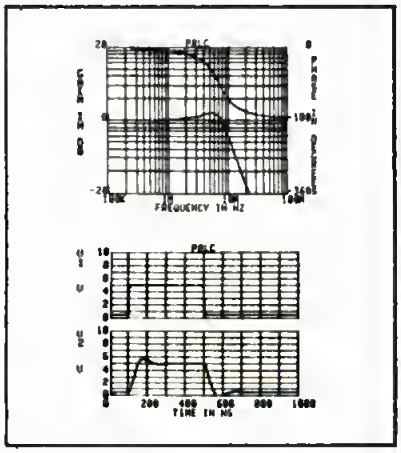

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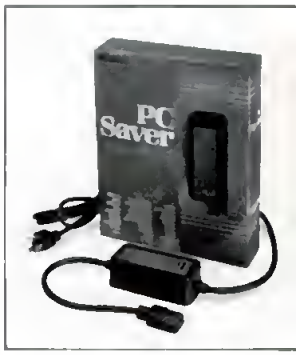

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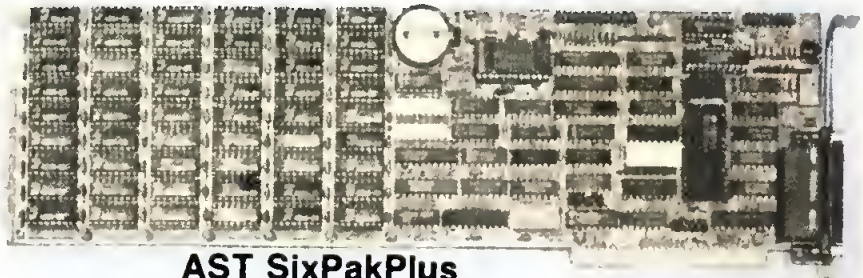

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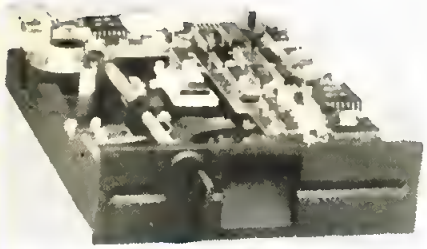

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Toto, The Tubes, and the PC

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Photograph: Dean Janoff

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He has equipped his office with PC XT and uses Lotus' *1-2-3*, *dBase II*, and *WordStar*, among others. "With my computer I can do all projecting in 2 hours instead of 3 weeks. Now I don't have to carry around reams of paper and file folders. It's all sitting here on a few disks," he said.

In his office Littleton puts the PC through its paces, demonstrating to Tubes' lead singer Fee Waybill how the machine can display a detailed printout of tour costs, profits, and bookings. A "cost section" breaks down the expenditures on everything from sound to insurance. A "profit section" shows the concert guarantees, estimated grosses, and production support funds. And the "itinerary section" indicates the names of all hotels, airline information, and showtimes throughout the band's nationwide swing.

While Littleton uses *1-2-3* to compare projected and actual costs after each show, his public relations assistant uses *WordStar* to generate press releases for the regional press, record company reps and local radio jocks.

Littleton discovered computers before he began working in the music business. "I went to computer school in 1970," he explained, "But I left and began working with Toto. I got into computers because I wanted to make my job easier. I took the PC home, sat down, and spent a month with the DOS 2.0 manual. It was pretty easy from there. I initially wrote a simple line editing program out of the DOS manual for itinerary formats and budgeting."

Following advice from Entercom, a computer consulting firm with offices in both Redondo Beach and Nevada City, California, Littleton upgraded his office system to hard disk and explored software applications the company recommended. "Entercom, which specializes in the entertainment business, is opening up the computer to a lot of people in the music industry who want to use a computer to save time and money but don't want to learn to program," he explained.

Saving money hasn't always been the concern of road-weary rock and rollers who traditionally have spent their evenings hanging out in motel rooms, not fiddling with computer keys. However, some of today's pop stars are as concerned with tax shelters as they are with "Gimme Shelter." Several of Littleton's clients have been smitten by the microbug. The PC has become a permanent resident at Toto band member Steve Porcaro's house. He is experimenting with musical notation applications. And Tubes' member Mike Cotten used an Atari 800 to design his band's costumes, set and prop projections, and layouts. In fact, he used the computer printout to convince David Bowie that the band's elaborate stage show could be accomplished on schedule without interfering with the star's appearance at center stage. As a result, the Tubes was selected as the opening act for Bowie's worldwide tour last summer.

The need for portability has led rock band tour managers to take computers other than the IBM-compatible Compaqs on the road.

On the Road

These applications may be ideal for home and office, but rock and rollers need micros on the road as well. Littleton is currently gearing up for an extensive spring road tour with Toto that begins in March, so he has purchased a Compaq for the mobile computing chores. He has even had a customized traveling case made, which holds the micro, a printer, a modem, the software and a photocopy machine—virtually his entire home office is now on casters. And, if all goes well, next time around the PC itself may hit the rock and roll trail.

The need for portability has led rock band tour managers to take computers other than the IBM-compatible Compaqs on the road. Music business accountant Neil Quateman of Beyond Management, in North Hollywood, California, took his Kaypro II on the road with The Who last year and later upgraded to the Kaypro 10 (10-megabyte hard disk) when he accompanied the Stevie Nicks/Joe Walsh tour. In both trips he evaluated the latest reports on ticket sales, advertising, security, and hall rental en route to the show. After the performances he used the computer to finalize settlements with the promoter's representative and others involved in putting on the concert. Quateman uses a Gemini 15 wide-carriage, dot-matrix printer; a Novation modem; and an electronic mail service to telecommunicate with the home office.

"When a production manager is trying to decide whether to use buses or planes to transport the tour members, I can generate cost comparisons more quickly. I use the computer to provide itineries, letters, cost comparisons, and pay schedules," Quatemen reported. "The musicians like seeing me work at the computer. It gives them a feeling of confidence. They know I'm doing a good job," he added.

Osbornes, Apples, and even Fortunes are hitting the road with touring bands these days. However, according to Entercom, the trend is toward IBM and compatible machines.

Entercom is currently recommending IBM and Compaq systems for use by rock bands in the office and on the road. Entercom vice president Dan Cooper used these computers last summer on the road with The Police and more recently with the rock band Black Sabbath in Europe. Also, at Entercom's suggestion another tour manager, Mike McGinley, recently switched from a Kaypro to a Compaq for

his current worldwide travels with the group Supertramp.

Portable Database

While on the road last year with The Police, Cooper was hard at work developing a rock tour database, which appears to be the application that the rock and roll caravans require most often. It covers everything from limousine rentals to hotel addresses and rates, stage hands, and venue statistics. In addition, the company is currently developing a historical record for concert promoters that will reveal how well particular rock bands and genres (that is, heavy metal, punk, rhythm and blues) have sold in any particular site, thus creating the rock industry's first survey of regional concert preferences and tastes.

Cooper's configuration includes the Compaq, an Epson printer, PC Modem Plus, and such software as *dBase II, Multiplan, Multimate,* and Lotus' *1-2-3*. "Using the computer resulted in better, more efficient communication," he reported. "It eliminates the mundane tasks. Several years from now all tours will be automated." Then he added cautiously, "I'm so involved in it that maybe I'm a little overconfident."

Maybe not. Jay Hagerman, an independent tour/account manager who contacted Entercom, has traveled with some of the biggest names in the rock business from Bob Dylan to Paul McCartney and currently armed with a Compaq, he is concert coordinator for the Supertramp world tour.

"In terms of outdoor shows, there are a tremendous number of expenses—much more than in an indoor show. On many occasions you're given a certain figure for an expense, let's say for stage hands suddenly things change. With the computer, I am able to revise figures instantly.

"In addition," Hagerman continued, "Entercom furnished me with an electronic mailbox on The Source for The Who tour. I had a Lex acoustic modem. At the end of an evening, when I had completed the settlement with the promoter, I used the computer to transmit a copy of the settlement into the agency's electronic mailbox. The following morning, it would access The Source and take out a copy of the settlement for their records and also one for The Who's accountants."

Why the move to the Compaq? "Because the Compaq has a built-in modem, I can directly communicate with another Compaq or any IBM PC," explained Hagerman.

> Most of the computer action on the road is limited to the big names in the world of rock.

Dave Furano, president of Entercom, reported: "The word from the tour was that the Compaq was dropped, abused, used on international power supply, and literally used all over the world in a very rugged way. It still worked like a charm." He compared the selection of MS-DOS format machines to the record business, and added, "It's like the decision to go to a 33⅓-rpm or 78-rpm or 45-rpm recording. An artist can write and format programs and have them reproduced in the broadest possible sense."

Eastwind Computer

Eastwind Computer Systems of Marina del Rey, California, is also gearing up for the computerization of the rock business with the idea of IBM compatibility in mind. For road use, it recommends the Compaq computer with a Hayes Super Modem, *dBase II, WordStar, VisiTrend/VisiPlot,* and a Microprism printer.

Why are the rock and rollers turning to IBM? Eastwind's president, Ian Moss, who has toured with groups including the Beach Boys and Ricky Nelson, replies: "Probably the same reason the rest of the business is going in that direction. It is our belief that IBM will become the standard within the entertainment industry . . . as well as at home."

Eastwind is creating its own database file on concert venue specifications, details such as the height of the risers, lighting setup, hall amperage, even the size of the back door. These custom files will be listed with The Source and, as a result, will be accessible 24 hours a day. Other applications software the company is recommending are *VisiCalc* (to simplify box office procedures), Microsoft's *Time Manager* (which serves as an electronic schedule book for PR events, interviews, etc.), *WordStar,* with *SpellStar* and *MailMerge,* and *dBase II*. However, with 600 facilities soon to be listed on the company's database, Moss explained, "They'll only need a modem and the ability to go onto The Source. They won't need a database program for long."

While the database is being compiled, Moss and his associates are still hard at work with their office XT. Eastwind is currently planning a road tour for disco star Taco, whose rewrite of the Irving Berlin hit "Puttin' On The Ritz" is riding high on the *Billboard* dance charts. According to Moss, they were using the hard disk computer to design the entire road tour—using everything from *VisiCalc* for spreadsheets on cost analysis to The Source for airline information and hotel and restaurant addresses in their target cities. The XT interfaces with an Epson MX 80 printer and a NEC green screen.

"We're not married to any format," Moss added. "If we find that one of the new generation of portables can do the job better we'll go with those instead."

While most of the computer action on the road is limited to the superstar range, rock stars of the future can also get a taste of micros. A series of new "working band" programs is being distributed by Passport Designs, Inc., of Half Moon Bay, California, a small town on the ocean side of the San Francisco Peninsula. The

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PC ROCKS AND ROLLS

company, which is noted for its musical synthesizer programs for the Apple II, is developing business software for professional musicians. It has announced three IBM-compatible programs: *Pickers & Pickers+* (for band scheduling, logging of income/expenses, personal inventory, and credits); *Writers & Writers+* (for song lyrics, royalty income, expenses, and song classification), and *Tour & Tour+*

> The band members weren't interested in knowing anything about a program doing numbers . . . although their manager certainly was.

(for coverage of club and arena data/income/expenses, promotional income/expenses, contract information, fan mailing lists, and equipment inventory).

Do the musicians appreciate the micropower that is keeping their tours on schedule, balancing their books, and keeping them from going belly-up? The answer is yes, at least as much as they appreciate a vintage Fender Stratocaster guitar.

On The Who tour, Hagerman introduced the band to the microcomputer. "They wanted to know, 'What kind of games can we play on this.' When I told them, 'No games on this machine,' they weren't interested in knowing anything about a program doing numbers . . . although their manager certainly was."

Fee Waybill of The Tubes—after witnessing Chris Littleton's proud demo of his office PC—said he liked the itinerary section of the program best. "The other guys in the band, though, they just throw the itinerary away. They figure it's always out of date. They don't care where they're going next," he shrugged. ■

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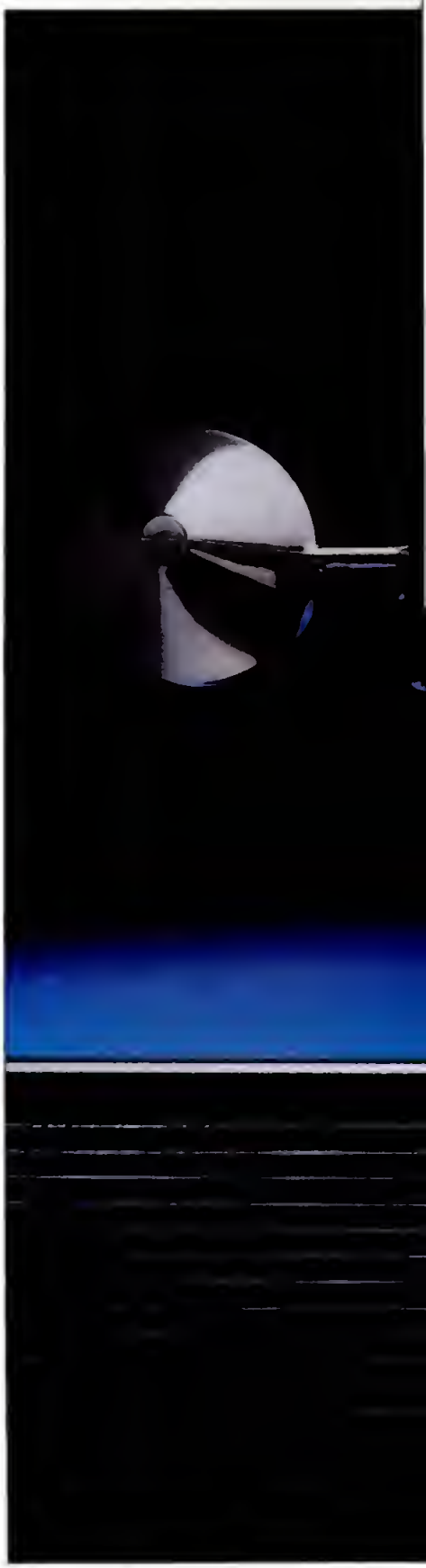
The PC Analyzes The Wind

Windmills, long considered obsolete, have begun to reappear. The PC helps determine a site's wind farm potential.

Remember windmills? From the 1920s to the early 1950s, they were a familiar sight in rural America where they frequently were the single source of electrical power. But by the 1950s, power lines were finally spread to remote farm areas, bringing cheap electricity. This hallmark of progress made windmills obsolete.

It appeared to be the end of an era, but now, with sophisticated wind technology and a little help from the IBM PC, windmills may be returning. Increased oil prices and tax incentives have spurred the investigation of wind power as an alternative energy source. Wind farms, huge collections of wind turbines, are currently operating in a number of locations around the country. But this business is as capricious as the wind itself, and wind power has not yet established itself as a widespread alternative source of power.

The main obstacle the wind power developer encounters is locating a suitable site for a farm, which requires constant high-speed winds.



Photograph: Gary Perweiler

Second Wind, in Somerville, Massachusetts, has developed a product called the AL-2000 Wind Resource Data Logger, which determines if sufficient wind exists on a given site to warrant the construction of an expensive wind turbine to capture the wind and generate electricity. Second Wind sells its customers this little black box, filled with electronic gear that registers various aspects of the wind and records the data on a 1-inch chip. It then analyzes the chip using an IBM PC and provides the customer with a report.

Selecting a Wind Site

Before a potential wind developer decides to buy the data logger, he must select a site to be evaluated. Common sense often dictates what to look for. Hills are good; ridges are even better. Both will lift your wind tower to greater heights, but, remember, much of the wind flow may pass around the sides of hills. Most of it goes over the top of a ridge, especially if the ridge is perpendicular to the major wind direction.

Seacoasts and mountain gaps are excellent sites; so are valleys that lay in the path of prevailing winds. Nearby trees or buildings cause a turbulent wake that can interfere with a turbine's operation. Complex formulas have been developed to inform wind users how high to build their towers over grass, trees, buildings, and other obstacles to avoid the wakes. But the rule of thumb is that the center of the turbine's rotor must be at least 30 feet higher than any obstacle within 300 feet of the tower. A tower placed downwind from a building should be at a distance 10 to 20 times the height of that building.

Though these factors will help the wind developer evaluate a site's potential, they can't possibly accurately determine its eligibility. According to Mike Sacarny, vice president and engineer at Second Wind, "Almost everyone overestimates the amount of wind he gets. In most parts of the world, you might get strong winds 3 or 4 months a year and not enough during the other 8 months."

Once the developer has assessed a site's potential, the next step is to purchase the $1,600 microprocessor-based Data Logger from Second Wind. The black box, which measures 8 by 10 by 4 inches and comes with an anemometer, is placed on the site to be evaluated. The box has read-out windows with 15 display panels with labels such as "velocity distrib" and "wind rose." (According to the product's instructions, wind rose is the amount of time that the wind persists from each of the eight directions of the compass.) The box has a plastic cover to protect it from the elements; if left uncovered, water may damage it irreparably.

The Data Logger, manufactured by Second Wind, sells for $1,600.

Some users read the data off the box's recording device every few weeks, but most allow it to operate for a few months or even a year before mailing the 1-inch chip back to Second Wind to be analyzed by the PC.

PC Analysis

Second Wind didn't always use the IBM PC for data chip analysis. "We used to use a mainframe to analyze our data," notes Sacarny, "but it was not here in our office, so it was inconvenient. We need to have our data here, stored on our diskettes, so we can run them any time we want. With the PC, we can do that. With the mainframe, we often found other people in our way. We couldn't kick off other users, so sometimes we couldn't work when we wanted to. Also, when the mainframe went down, we were dead. If our PC goes down, we can rent another one immediately. And, with the PC, we can experiment and get just exactly the peripherals we want. That isn't possible with a mainframe."

Sacarny himself feeds the data into the PC using an Erasable Programmable Read-Only Memory (EPROM) reader, which interfaces with the PC RS232 port. Using Pascal programs written by Sacarny, the data for each site—wind direction, power, velocity, peaks, and lulls—is processed by the PC and printed on an Okidata printer. The process takes only a few seconds. Second Wind will provide the customer with bar and circle graphs illustrating wind patterns. These are produced using an attached HP 7475 color plotter.

To begin the PC analysis process, Sacarny pushes the 2K- or 4K-chip, fresh from months in a mountain pasture, into his EPROM reader (which was manufactured by Bay Technical Associates and modified by Sacarny to make it compatible with the IBM PC). Sacarny has developed a software package called *The Archiving Utility* that retrieves the data from the chip and stores these numbers on a diskette.

Sacarny has also developed two other pieces of software to analyze wind numbers. One, the *GETWIND*, puts the wind data for each site into an elaborate Pascal record. The third piece of software, *Data Interchange Utility*, is a program that puts the wind site data into a DIF file. (For a discussion of DIF files, see "What's The DIF?" in this issue.) His software has been developed for the PC because he owns one and so do some of his customers. Second Wind sells this software to its users so they can analyze their own chips.

After the PC retrieves the numbers from the 1-inch chip and stores them on a diskette, it produces a printout (see Figure 1) of columns of figures indicating how hard the wind was blowing on a given site, the direction the wind was coming from each hour, lulls and their duration, peak wind speeds, and the average wind speed.

Some customers take the printouts and

examine the results themselves to determine whether the site could be an efficient producer of electricity, while others ask Second Wind to do the analysis. This analysis entails converting the wind speeds for a given site into an estimate of the kilowatt hours that would have been produced by a wind turbine of a given size during the data-gathering period. For example, a 2-kilowatt machine operating for 6 months in average winds of 20 mph will produce 4,550 kilowatt hours.

Kilowatt hours represent dollars the wind farm developer could earn if he put up a windmill of a given size on a particular location and sold electricity to the power company. The price per kilowatt hour paid by utilities to purchase electricity varies across the nation.

> Wind machines in the same area can produce very different results. You have to find out where the wind is.

At present, Sacarny performs these calculations—converting columns of wind velocity figures into kilowatt hours—with a hand calculator. But he is designing a software program that will enable his PC to perform this task for him.

"The purpose of the chip analysis is to get the wind data in a form where you can use it with applications programs," he explains. "If you know the productivity of the turbine, and you know at what times you can produce power, then you already have a good chunk of your economics done for you.

"If you were able to look into one of our chips, what you would see is rows and rows of numbers. Our software programs suck the numbers off the chip, puts them into archive data, and then arranges the archive data into a big Pascal record in a usable form.

"Once the client can see how many kilowatts could be produced at a given site at each hour, he can determine whether or not the economics justify the investment in a windmill at that location."

The wind developer then uses the resulting printouts and graphics to convince potential investors of the merits of his proposed wind farm.

Sacarny also uses his PC with *WordStar* to produce technical manuals and instructions for Second Wind's equipment.

```
SITING DATA FOR: Jim Brann

SITING LOCATION: Endless Mountains, Pa.

DATA FOR SENSOR PAIR "A"

DATA FOR MONTH 5/1982
   (from DAY 4 AT 14:52 till the end of the month)


PEAK WIND SPEED OF 47.5 MPH ON DAY 17 AT 17:55

LONGEST ENERGY LULL OF 3 HOURS ENDING ON DAY 28 AT 11:55

VELOCITY DISTRIBUTIONS FOR THIS MONTH: (HOURS)

 RANGE: (MPH):00-06:06-08:08-10:10-12:12-14:14-16:16-18:18-20:20-22:22-24:24-26:26-28:28-30:30-32:32-34:34-36:36-38: >>38:
 TOTAL:      : 18 : 25 : 32 : 44 : 57 : 67 : 78 : 86 : 75 : 61 : 47 : 31 : 18 :  8 :  4 :  2 :  2 :  2 :
 SLOW D0/DT:      : 25 : 32 : 44 : 57 : 67 : 78 : 86 : 75 : 61 : 47 : 31 : 18 :  8 :  4 :  2 :  2 :
 MEDIUM D0/DT:    :  0 :  0 :  0 :  0 :  0 :  0 :  0 :  0 :  0 :  0 :  0 :  0 :  0 :  0 :  0 :  0 :
 FAST D0/DT:      :  0 :  0 :  0 :  0 :  0 :  0 :  0 :  0 :  0 :  0 :  0 :  0 :  0 :  0 :  0 :  0 :
                  Note: '255' represents an overflow.


WIND ROSE DATA: (HOURS)

  RANGE:  (MPH): 06-12 : 12-18 : 18-24 :  >>24 :
  NORTH:       :   18  :   59  :   35  :    8  :
  NOREAST:     :   20  :   76  :  131  :   74  :
  EAST:        :   20  :   32  :   42  :   30  :
  SOUEAST:     :   15  :   15  :    6  :    1  :
  SOUTH:       :    7  :    2  :    0  :    0  :
  SOUWEST:     :    6  :    2  :    0  :    0  :
  WEST:        :    8  :    8  :    3  :    1  :
  NORWEST:     :    7  :    9  :    5  :    1  :


DIURNAL DATA: (MPH)

 TIME: (O:CLOCK)    : 00-02 : 02-04 : 04-06 : 06-08 : 08-10 : 10-12 : 12-14 : 14-16 : 16-18 : 18-20 : 20-22 : 22-24 :
 AVERAGE:           : 19.625: 18.500: 18.125: 16.750: 15.875: 14.625: 14.625: 16.625: 18.875: 20.125: 20.000: 20.000:
 STANDARD DEVIATION: :  4.5 :  5.0 :  5.5 :  4.5 :  6.5 :  6.0 :  6.5 :  6.0 :  6.5 :  6.0 :  5.0 :  4.5 :

MONTHLY AVERAGE WIND SPEED: 17.81 MPH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                                                            7 Davis Square
                                                 Somerville Massachusetts 02144
                                                            (617) 776-8520
```

Figure 1: *The PC "reads" the data chip from the Wind Resource Data Logger and generates velocity, wind rose, and diurnal data. This particular report is for a turbine site in Endless Mountains, Pennsylvania.*

The PC Watches Windmills

In the summer of 1982, NFC Energy Corporation, a power company in San Francisco, mounted a dozen AL-2000 Data Loggers on trailers and moved them about their leased 1,500 acres in the Alta-

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	★ A70 286K Drive	$ 599	$ 299
	A40 A70 Controller	$ 100	$ 79
SUPER 5 1/2 HIGH	ALPS, A40, Belt Drive, 163K	$ 299	$ 199
	TEAC T40, Direct Drive 163K	$ 349	$ 239
	TEAC, T80, Double Sided, 326K	$ 449	$ 329
	Controller Card	$ 110	$ 59
Rana	Elite 1 163K 40 TK	$ 379	$ 249
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	Elite 3 652K 160 TK	$ 849	$ 499
	Elite Controller	$ 145	$ 84
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MISCELLANEOUS

ALS	The CP M Card V3 0 (- or e)	$ 399	$299
	Z-Card (- or e)	$ 149	$129
	Color II (- or e)	$ 179	$135
ASTAR	RF Modulator to use TV	$ 36	$ 25
★ CCS	Serial Interface 7710A	$ 150	$ 99
Eastside	Wild Card (copier - or e)	$ 140	$ 99
	Wild Card Plus	$ 180	$140
Kensington	System Saver	$ 90	$ 49
Key Tronic	KB200 keyboard (S -)	$ 298	$219
★ Koala	Graphics Pad	$ 125	$ 99
Kraft	Joystick (Ap II S -)	$ 69	$ 59
	Paddle (Ap II S -)	$ 50	$ 36
M&R	Sup R Ran (- or e)	$ 50	$ 49
★ Microsoft	Z80 Softcard (- or e)	$ 345	$225
	Z80 Softcard Plus (- or e)	$ 645	$459
	Softcard Premium Pack (II +)	$ 695	$495
	Softcard Premium Pack (IIe)	$ 495	$395
Micro Tek	Dumping 64 Buffer	$ 349	$269
★ Orange Micro	Grappler Plus (e or +)	$ 175	$119
	16K Buffer Board for Grappler +	$ 175	$118
	Buffered Grappler + 16K	$ 245	$179
Paymar	Lower Case Chip (S -)	$ 50	$ 49
★ PCPI	Appli-Card, 14 features 6 Mhz	$ 375	$275
	128K Memory Expand Board	$ 495	$395
RH Electronics	Super Fan II	$ 75	$ 59
★ Saturn Systems	Accelerator S	$ 599	$449
Transend, SSM	AIO II, Serial, Para I F	$ 225	$199
TG Products	Game Paddles (II +)	$ 40	$ 29
	Joystick (II +)	$ 60	$ 49

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SOFTWARE for APPLE II+/IIe

BUSINESS

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Artsci	MagicWindow II NEW!	$ 150	$ 49
	Magic Combo (Wind Mail $ Words)	$ 225	$199
★ Ashton-Tate	dBase II (Req CP M 80)	$ 700	$385
	Financial Planner (Req CP M 80)	$ 700	$395
	Friday (Requires CP M 80)	$ 295	$149
BPI Systems,	GL, AR, AP, PR or INV, each	$ 395	$295
Broderbund,	Bank Street Writer	$ 70	$ 47
Continental,	GL, AR, AP or PR ea	$ 250	$149
	Home Accountant	$ 75	$ 59
	FCM	$ 100	$ 99
Dow Jones	Market Analyzer	$ 350	$275
	Market Manager	$ 300	$235
	Market Microscope	$ 700	$525
Fox $ Geller	Quickcode (for dBase II)	$ 295	$185
	dGraph (for dBase II)	$ 295	$195
	dUtility (for dBase II)	$ 99	$ 99
Hayden	Pie Writer (Specify 80 col board)	$ 150	$ 99
Howard Soft,	Real Estate Analyzer II	$ 195	$125
	Tax Preparer	$ 225	$199
LJK	Letter Perfect w Mail Merge	$ 150	$ 99
Micro Craft	(requires Z80 CP M-Card)		
	Verdict or Bulkeeper	$ 995	$469
Micro Lab,	Tax Manager	$ 180	$118
Micro Pro	(all require Z80-CP M Card)		
★	WordStar w Applicard & CP M SPECIAL	$ 495	$325
	WordStar ' + Training Manual SPECIAL	$ 495	$239
	MailMerge ™ SPECIAL	$ 250	$129
	SpellStar ™ SPECIAL	$ 250	$129
★	WordStar Professional 4 Pak SPECIAL	$ 895	$429
Microsoft,	Multi-Plan (CP M or Apple DOS)	$ 275	$175
	Financial, Multitool (CP M or DOS)	$ 100	$ 75
	Budget, Multitool (CP M or DOS)	$ 150	$115
★ Osborne/C.P. Soft	(Disk and Book) (Stat Bus $ Math)		
	Some Common Basic Programs (75 each)	$ 100	$ 49
	Practical Basic Programs (40 each)	$ 100	$ 99
Peachtree,	Requires CP M $ MBasic 40 columns		
	Series 40 GL $ AR $ AP, all 3	$ 595	$395
	Series II Text & Spell $ Mail all 3	$ 595	$395
Perfect,	Perfect Writer	$ 495	$199
	Perfect Speller	$ 295	$ 99
	Perfect Writer Speller 2 Pak	$ 695	$199
	Perfect Filer	$ 595	$259
Quark,	Word Juggler (IIe)	$ 239	$179
	Lexcheck (IIe (use w Juggler)	$ 149	$ 49
Sensible	Sens. Speller, specify 80 Col Brd.	$ 125	$ 89
Sierra On-Line	Screen Writer Professional	$ 200	$125
	Screen Writer II	$ 130	$ 49
	The Dictionary NEW!	$ 100	$ 49
	General Manager $ NEW!	$ 230	$155
★ Silicon Valley	Word Handler	$ 250	$ 49
★	List Handler	$ 90	$ 35
Software Publishing,	PFS File	$ 125	$ 84
(specify - or e)	PFS Report	$ 125	$ 84
	PFS Graph	$ 125	$ 84
Stoneware	DB Master Version 4 0	$ 350	$229
	DB Utility I or II	$ 99	$ 49

BUSINESS

System Plus,	GL, A/P, $ A/R, 3 Pak	$ 995	$ 595
Videx	Applewriter II preboot disk	$ 20	$ 15
	Visicalc 80 col preboot disk	$ 30	$ 49
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	Visicalc 3.3	$ 250	$ 149
	Visicalc Enhanced (IIe) NEW!	$ 250	$ 179
	VisiFile or VisiDex, each	$ 250	$ 175

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	Double-Take	$ 35	$ 25
	Typefaces (Req Ap Mechanic)	$ 20	$ 15
	DOSS Boss or Utility City, each	$ 30	$ 22
	Tip Disk #1	$ 20	$ 15
	Pronto DOSS	$ 30	$ 40
	Alpha Plot	$ 40	$ 27
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★	Copy II Plus (bit copier)	$ 40	$ 40
Einstein,	Compiler, for Applesoft BASIC	$ 129	$ 49
Epson	Graphics Dump	$ 15	$ 8
Heyes,	Terminal Program	$ 100	$ 90
★ Insoft	GraFORTH by Paul Lutus	$ 75	$ 49
Microsoft	A.L.D.S	$ 125	$ 75
	Cobol 80	$ 750	$ 309
	Fortran 80	$ 195	$ 199
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Penguin,	Comp Grphcs. Sys. NEW!	$ 70	$ 53
	Graphics Magician NEW!	$ 60	$ 41
Phoenix,	Zoom Grafix	$ 40	$ 34
Quality,	Bag of Tricks NEW!	$ 40	$ 35

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CBASIC Compiler (CB80)	$ 500	$ 339
Pascal MT +	$ 350	$ 239
CIS COBOL	$ 850	$ 575
PL 1	$ 550	$ 375
C Compiler	$ 350	$ 350
FOX $ GELLER, Quick Code	$ 295	$ 149
dUtil	$ 99	$ 62
dGraph	$ 295	$ 185
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Deadline or Planetfall, each	$ 60	$ 39
MICROCRAFT, Verdict or Bulkeeper each	$ 995	$ 399
MICROPRO, WordStar '	$ 495	$ 339
MailMerge '	$ 250	$ 135
WordStar Prof. 4 Pak	$ 995	$ 429
MICROSOFT, Multiplan	$ 275	$ 149
COBOL-80 Compiler SPECIAL	$ 750	$ 350

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DMP-40, 1 pen		$ 775
DMP-29, 8 pen		$1495
DMP-41		$2295
AMDEK, DXY-100, 10" x 14", Para.	$ 749	$ 599
Amplot II, 10" x 14" 4 motor 8 P	$1299	$ 999
HP 12C	$ 120	$ 99
HP 11C	$ 90	$ 75
41C Calculator	$ 149	$ 149
41CV Calculator w 2 2K Mem	$ 275	$ 219
Call on accessories and software.		
for the ATARI		
RANA 1000 Drive, 325K	$ 449	$ 389
KOALA, Graphics Pad	$ 100	$ 75

DISKETTES

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10 each Pulse I DS DD 48TPI	$ 99	$ 32
10 each Pulse II, DS QD, 96TPI	$ 40	$ 40
CDC		
100 each SS SD 35T (Apple, Atari)	$ 350	$ 369
10 each SS SD 35T (Apple, Atari)	$ 45	$ 15
100 each SS, DD, 48T (Apple, IBM)	$ 550	$ 179
10 each SS, DD, 48T (Apple, IBM)	$ 55	$ 15
100 each DS, DD 96T, (IBM, H P)	$ 750	$ 299
10 each DS, DD 48T (IBM, H P)	$ 75	$ 49
DYSAN, 10 each SS SD (Apple, etc.)	$ 49	$ 49
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MAXELL, 10 each, MD-1, SS, DD	$ 55	$ 49
10 each, MD2-D, DS DD	$ 75	$ 49
MEMOREX		
10 each SS DD Type A (Apple, Atari)	$ 49	$ 29
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Mark XII	$ 300	$ 300
HAYES, IBM-PC Smartmodem 1200 B	$ 599	$ 439
IBM-PC Smartcom II Software	$ 115	$ 49
Stack Chronograph (RS-232)	$ 249	$ 169
Stack Smartmodem 300 (RS-232)	$ 399	$ 225
Smartmodem 1200 (RS-232)	$ 699	$ 525
Micromodem 100 (S-100 bus)	$ 399	$ 275
Micromodem II (for the Apple II)	$ 379	$ 275
Apple Terminal Program	$ 100	$ 49
IBM-PC to Modem Cable	$ 30	$ 29
NOVATION, All below require RS-232		
Applecat $ Modem, 300 BAUD	$ 399	$ 299
212 Apple Cat, 1200 BAUD	$ 725	$ 599
PC-Cat with Crosstalk	$ 599	$ 419
Cat	$ 149	$ 139
D-Cat	$ 149	$ 149
J-Cat	$ 149	$ 104
212 Auto Cat	$ 995	$ 579
Smart Cat 103/212	$ 599	$ 415
SSM, Transcend 1 for Apple $ Data Comm.	$ 69	$ 69
Modem Card for the Apple II	$ 299	$ 299
Transmodem 1200 (110 300/1200)	$ 995	$ 666

SOFTWARE, SEE APPLE OR IBM UTILITY SOFTWARE SECTIONS

MONITORS AND ACCESSORIES

★ AMDEK, 12" Green, #300G	$ 300	$ 139
★ 12" Amber, #300A	$ 210	$ 149
★ 12" Amber, 310A for IBM-PC	$ 230	$ 149
★ 13" Color I, Composite	$ 379	$ 299
★ 13" Color II, RGB, Hi Res	$ 529	$ 439
OVM, Color II or III to Apple S I/F	$ 199	$ 175
NEC, 12" Green, Model JB1201M	$ 249	$ 209
12" Color, Composite, JC1215M	$ 400	$ 299
12" Color, RGB IBM Model JC 1203	$ 399	$ 369
★ PRINCETON, RGB Hi Res, HX-12	$ 795	$ 599
QUADRAM, Quadchrome 12" RGB Color	$ 795	$ 599
Quadrascreen 17", 256 x 512	$1995	$1299
SANYO, 12" Green, Model DM8112CX	$ 260	$ 209
ZENITH, 12" Green, Model ZVM123 NEW!	$ 300	$ 115

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DOT MATRIX PRINTERS:

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FX80, CPS		Call
MX100F/T, 80 CPS, w/Graftrax +	$ 999	$ 699
FX100, CPS		Call
Apple $ Graphics Dump Program	$ 15	$ 8
LEADING EDGE, Gorilla Banana	$ 250	$ 200
OKIDATA, 82A, 80 col., 120 cps, Para.	$ 549	$ 449
83A, 132 col., 120 cps, Para.	$ 599	$ 399
92, 160 CPS, 80 Col., Para.	$ 899	$ 559
93, 160 CPS, 136 Col., Para.	$1249	$ 899
2350P, Pacemark, 350 cps, Para.	$2995	$2095
2410P, Pacemark, 350 cps, Para.	$2995	$2399
ORANGE MICRO, Grappler + , for Apple	$ 299	$ 149
PRACTICAL, Microbuffer In-Line 64K, Para.	$ 349	$ 299
Microbuffer In-Line 64K Serial	$ 349	$ 299
★ STAR MICRO., Gemini 10"X, 120cps, 2.3K	$ 399	$ 399
Gemini 15"X, 120cps, 2.3K	Call	Call
IBM-PC to Epson or Star Micronics Cable	$ 60	$ 35
Apple I/F and Cable for Epson or Gemini	$ 49	$ 49

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SILVER REED, EXP550P, 16 cps, 5 pitch	$ 899	$ 615
EXP550S, 18 cps, 3 pitch	$ 999	$ 699
Tractor Feed for EXP 500	$ 160	$ 125
★ TTX, 13 cps, Para. $ Ser., Pin $ Friction	$ 999	$ 699

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CORVUS

Corvus	5 Meg	$2095	$1695
	11 Meg	$2750	$2295
Drives Without Interfaces	20 Meg	$3750	$3095
IBM-PC Interface Manual, S W & Cable Kit		$ 300	$ 239
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Other Interfaces, Omni-Net, Constellation, Mirror, CALL.			

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AST	ComboPlus, 64K S/P/C	$ 395	$ 279
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	I/O Plus II 2S/P/C/G	$ 315	$ 169
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CCS	SuperVision, monochrome board	$ 850	$ 680
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	Vertical CPU "System Stand"	$ 29	$ 19
	Monochrome Ext. Cable Pair	$ 40	$ 30
HERCULES	Monochrome Board	$ 499	$ 379
Key Tronic	KB5150 Std. keyboard	$ 269	$ 199
Koala	Koala Pad™	$ 150	$ 109
	Programmer's Guide	$ 15	$ 12
MAYNARD	Multifunction (6) Card, MFC Modules for above card	$ 99	$ 79 Call
	SandStar, no RAM card	$ 199	$ 169
	SandStar, 256K Card	$ 495	$ 395

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	SystemCard 256K	$ 395	$ 275
	SystemCard 64K	$ 625	$ 435
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MOUSE SYSTEMS	PC Mouse w/software	$ 295	$ 195
ORCHID	PCnet™, LOCAL AREA NET	$1490	$1199
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PLANTRONICS	ColorPlus, 16 color brd. w/Para Port	$ 475	$ 379
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	Quadboard 64K, expandable to 256K	$ 395	$ 275
★	Quadboard 256K, 8 function	$ 595	$ 395
	Quadboard II no RAM, expand to 256K	Call	Call
	Quadboard II 64K, expandable to 256K	$ 395	$ 279
	Quadboard II 256K, 8 function	$ 595	$ 396
	Quad 512+, 64K plus serial port	$ 525	$ 295
	Quad 512+, 256K plus serial port	$ 550	$ 420
	Quad 512+, 512K plus serial port	$ 695	$ 525
	Quadcolor I board, 16 colors	$ 295	$ 225
	Quadcolor II board, use with Quadcolor I	$ 275	$ 206
	Quadchrome, 12" RGB Monitor	$ 795	$ 495
	Quadscreen, 17" 968 x 512 Monitor	$1995	$1595
	Microlazer w/Copy P/P, 8K, #MP8 w/P.S.	$ 199	$ 139
	Microlazer, w/Copy P/P 64K, #MP64 w/P.S.	$ 319	$ 219
	Microlazer w/Copy P/P 128K, #MP128 w/P.S.	$ 495	$ 295
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	27 Meg, Fixed	$2895	$2295
	72 Meg, Fixed	$6500	$4999
VISTA	IBM-PC XT 6MB Backup for Hard Disk, V1200	$1549	$1049

SOFTWARE for the IBM-PC or XT

BUSINESS

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	Market Microscope	$ 700	$ 525
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	Memory Trainer NEW!	$ 80	$ 55
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	FOX & GELLER Quickcode (MSDOS)	$ 295	$ 179
	dGraph (MSDOS)	$ 295	$ 179
	dUtil for IBM PC DOS	$ 99	$ 59
	HAYDEN IBM Pie Writer	$ 200	$ 135
	Pie Speller	$ 100	$ 69
	HOWARDSOFT Real Estate Analyzer II	$ 250	$ 189
	INFOR. UNLIMITED EasyWriter II (WP)	$ 350	$ 289
	EasySpeller II	$ 225	$ 169
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★	**LOTUS** 1-2-3	$ 495	$ 329
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	MICRO LAB Miner 2049	$ 40	$ 29
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	MailMerge™	$ 250	$ 129
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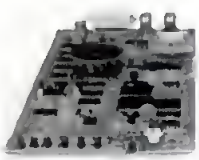

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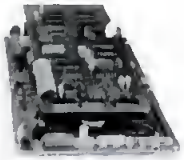

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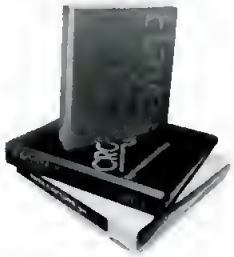

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CIRCLE 178 ON READER SERVICE CARD

mont Pass, 30 miles east of San Francisco, leaving them on each site for several weeks. It was a search for high-quality wind.

At each location, the data logger measured wind direction, velocity, and endurance and stored this information on its chip. Most of the chips were mailed back to Second Wind for retrieval and analysis, but some were analyzed in San Francisco by NFC meteorologist Ron Nierenbirg.

Throughout the summer and fall, Nierenbirg was frequently on the phone with the folks at Second Wind discussing data from the PC runs. On the basis of wind data gathered from these hundreds of potential sites and then analyzed by Second Wind's PC, NFC determined precisely where to put up 60 huge 75-kilowatt turbines. They are currently under construction and will be operating in the Altamont Pass by spring, producing electricity that will be sold to Pacific Gas & Electric (PG&E). Another 100 turbines will be installed on the NFC wind farms by the end of 1984. The sites for these, too, will be determined by Second Wind's analysis of the Data Logger chips.

"Second Wind's Data Loggers are rugged," says Kenneth Cohn, director of technical services at NFC. "And their analysis of chips was invaluable to us. Using the trailers with the anemometers and the data loggers saved us a lot of time and tower building. It's an ideal way to check out a lot of sites for efficiency. You do have to be careful in this business. Wind machines in the same area can produce very different results. You have to find out where the wind is.

"Our goal is to produce energy that has the same characteristics as that from any other type of generating station," says Cohn. "To do that, we need to know the wind characteristics throughout our property and what times of day we can expect peaks and lulls.

"It's an engineering process. This is a business of extracting energy from the wind."

Cohn uses the information from the PC analysis of his sites not only as a guide to placement of windmills, but also as a means of convincing prospective investors of the profitability of proposed wind farm locations.

He has just purchased an IBM PC for the NFC office in San Francisco and the company will do some of its own chip archiving and analysis there, using the software packages designed by Sacarny.

But the major reason NFC purchased a PC is that Cohn intends to have it watch over the windmills. He plans to have the PC continuously monitor, via phone lines, the performance of more than 200 NFC wind turbines and generators located 30 miles away in Altamont Pass. The PC will record the performance of each of these turbines on the NFC wind farm, computing precisely how much electricity they generate for PG&E each hour.

NFC expects to have the interconnections made, the PC software designed, and the windmills up and running by late spring.

"It should work well around the clock and save a lot of manpower expense," says Cohn.

Wind's Future

The future of the wind business is uncertain. It is only in the past few years that the giant wind farms have been con-

The Altamont Pass wind farm, near San Francisco.

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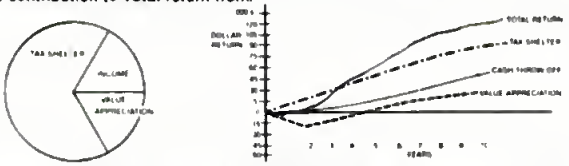

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CIRCLE 408 ON READER SERVICE CARD

PC WIND ANALYZERS

structured. Second Wind believes that a lot of wind turbines will be built in isolated rural areas. The technology of the turbines has become efficient enough now that it is economically productive to put one up if you have a farm or a home far from the power grid. But, you must have sufficient wind, a factor you can't control. The big wind farms will make money in areas

The future of the wind business is uncertain.

where steady winds exist. But starting up the farms requires a substantial investment, and if the government were to cut back on tax breaks, starting new wind farms would become extremely difficult to finance.

The wind farms have not been operating for a sufficient length of time to determine if they will indeed produce megawatts of profit. But it appears that some of them will produce substantial power—enough to sell to electrical utilities. Whether sales to these utilities will produce sufficient profits remains to be determined. It does appear, however, that the future of first-rate wind measurement will be tied to Second Wind's PC analysis.

Site analysis and conversion of wind power into potential kilowatt bucks will be done in some firms with Sacarny's PC software.

If NFC's plan to have its PC continuously monitor the performance and kilowatt output of hundreds of windmills succeeds, it is likely that other wind farm companies will lay off the crews that now perform this task and replace them with IBM PCs. ■

Articles by James Brann have appeared in The New Republic, The Nation, Saturday Review, Science Digest, The Washington Post, *and many other publications. He is a professor of journalism at Boston University's School of Public Communications.*

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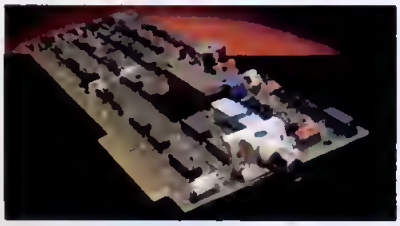

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CIRCLE 426 ON READER SERVICE CARD

Adding It Up With StatPac

Now movies and veteran number crunchers alike have a versatile and convenient program to do statistical analogs based on a popuar mainframe social science package.

The statistical analysis package *StatPac*, produced for the IBM PC, is especially designed for survey data sets such as those developed for public opinion or marketing research. The program is modeled after the comprehensive and highly popular mainframe analysis package *SPSS* (Statistical Package for the Social Sciences).

StatPac
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(612) 866-9022
List Price: $400
Requires: 128K RAM two disk drives.

CIRCLE 715 ON READER SERVICE CARD

SPSS was developed in the mid-sixties by a group of political scientists frustrated with the undocumented single-purpose programs they had been using to analyze public opinion surveys. Working at the nonprofit National Opinion Research Center (NORC) at the University of Chicago, they set about developing an integrated program package. With several scholars contributing to its development, *SSPS*'s capabilities grew rapidly. The finished program covered virtually every important statistical technique and data analytic procedure used in the social sciences.

By the mid-seventies, *SPSS* was installed on hundreds of mainframes throughout the world, not only in universities, but also in private corporations, government agencies, and data tabulation service bureaus. The success of *SPSS* was so great that it threatened the nonprofit status of NORC, which was forced to sever the relationship. SPSS, Inc., was then created as a private corporation.

SPSS came to be used as a general-purpose tool for doing all kinds of data analyses on all kinds of data sets. In addition to opinion, attitude, or marketing surveys, computerized analyses can be done on personnel records, economic time series data, medical histories, results of laboratory experiments on mice, archeological data, voting records of congressmen, student test scores, and customer, membership, and subscriber lists—in other words, analysis can be done on any data

set containing numeric or attribute data.

Filling a Need

Anyone familiar with *SPSS* will immediately feel at home with *StatPac*, although the enormous range of programs and options provided by the large mainframe package will most certainly be missed. Nonetheless, by successfully bringing an *SPSS*-like capability to the PC, *StatPac* is filling an important niche. This package will be very much welcomed by the survey research community and by social scientists, statisticians, and others who want to use the PC to perform basic tabulations and statistical analyses.

StatPac is a batch system that can handle 5,000 cases and 255 columns of variables in either a fixed or free format, which means that the number of columns occupied by each variable can either be set by the operator or left "free" for the program to establish. A recently added feature that allows users to merge multiple files and codebooks makes it possible for a data analysis program to handle an infinite number of variables.

StatPac offers a wide range of such programs and also various data manipulation utilities, which enable users to sort files, write subfiles, select a subcategory of cases, recode variables, and compute composite scores and indices.

The package, which consists of a three-ring binder manual and three single-sided disks, requires 128K RAM, two disk drives, a line printer, and either a color monochrome monitor. It may be configured to run with a RAM disk or a hard disk.

Clear and well written, the *StatPac* manual is exceptionally considerate of the novice user and is sensitive to what the reader needs to know each step of the way. The manual needs no index—the table of contents alone is quite adequate to quickly guide you to the proper section for just about any inquiry you may have. Although a well-written background review of each statistical procedure is included in an appendix, the proper use of the more advanced techniques does require the appropriate technical background and training. *StatPac* will help you do statistics; it does not attempt to teach the subject. It does not, moreover, spell out everything you might wish to know—how to obtain a correlation matrix, for instance. Nevertheless, the basic data analysis tasks are straightforward and easy to implement.

Ease of editing and the use of menus throughout make the system easy to operate. There are many considerate touches such as noncryptic screen prompting, the option to move the SHIFT key to its normal typewriter position and periodic automatic saves during codebook development.

All screen-directed operations are fast and thoughtfully designed. Tabular results, however, are not available for screen viewing—all analytic output is sent to the printer. This means that you can set things up conveniently, develop a control program to specify a lengthy sequence of analytic tasks, press the ENTER key, and then go to lunch. Execution times are quite slow with *StatPac* and tables are produced on the printer only every few minutes. You needn't worry, however, if you leave the PC during the analysis phase. (It might be wise, however, to stay within earshot of your printer, unless it is exceptionally reliable). If the system cannot perform a particular task because of a format error or an insufficient number of cases, it will not hang up. Instead, it will simply go on to the next item in the control file. You will need to check the tables later, however, to identify any skipped tasks since error messages appear on the screen but not in the printed output.

Codebook and Data Management

StatPac has three major components: procedures for the creation of a codebook, for data entry, and for development of control files that manage the batched data analyses.

The first step in using *StatPac* is to develop a codebook that describes the data file format, customized headings, and the labels to be used for all variables and value categories. These headings and labels will appear on the various statistical printouts.

StatPac will help you to do statistics; it does not attempt to teach the subject.

The codebook program also offers options for the handling of missing data, provides for automatic column control during data entry, and has extensive error trapping and editing features. You can edit or add variables to an existing codebook and make a hard copy of the codebook for use in planning data analysis runs.

For the data file format that appears in Figure 1, a sample population was surveyed for 11 variables—age, sex, ethnic origin, and so forth. These variables are listed in the codebook. Each is identified as either alpha or numeric. The permissible responses for alpha variables are listed (for example, M and F for sex), and the number of columns that the value of each variable can occupy is fixed. The starting column for each variable is also indicated. These parameters then govern the data entry procedure—the order in which variables appear on the screen, the screen prompts, and so forth.

The data file management programs allow you to enter data directly from the PC keyboard by using *StatPac*'s second major component—its well-prompted data entry procedure. The prompts draw directly on the information you placed in the codebook, flashing the case number and the names of each variable on the screen in turn as you key in the data for each case. The program automatically screens the type and number of columns of keyboarded data. It will not accept a numeric value when the variable is an alpha symbol, and vice versa. If the variable requires a two-column value, the screen will not record the third item of a

three-column entry, nor will it advance to the next variable if only a one-column entry is made. For some reason, the periodic automatic save feature is not provided for data entry, although it is for codebook development. You can save manually at any time, however, with just one keystroke. It is also possible with *StatPac* to import data files developed by other programs including *dBase II* and *VisiCalc* or to have a datafile downloaded from a mainframe. *StatPac* has a variety of useful record search and editing features and can edit files larger than memory size. You can, if you wish, get a complete listing or data dump of the entire file or obtain a listing—but not a cross-tabulation—of only selected variables and/or selected cases.

The third major component of *StatPac* is a set of programs to create the task control file that describes the analyses to be performed and the tables to be printed. A single task control file can specify hundreds of tasks and can be constructed quickly and easily using several convenient features. For example, users can indicate a range of variables for a given task which means that if you are a manufacturer and want to see how many consumers described your product on 25 attributes included in a customer survey, you can request a set of frequency distributions for variables 1 through 25 with only a single keyboarded command sequence. Control files can easily be edited and can, of course, be saved for future use.

Data Analysis Programs

Although *StatPac*'s data analytic task programs are only a small subset of those available in *SPSS*, they do cover the fundamental bread-and-butter needs of the survey data analyst. First there are the basic frequency distribution reports that you will probably run for all variables in the study. These reports are fully labeled, give both frequencies and percentages, and indicate the number of cases missing data. Figure 2, for instance, displays the frequency distribution of females and males in a sample of 2,055: 720 and 1,335, respectively. The sample was 35 percent female, 65 percent male, and no respondent failed to indicate his or her gender. Responses were obtained from 100 percent of the sample.

Another *StatPac* task program, descriptive statistics, gives you a wide variety of summary statistics for any of the following variables: the mean; the median; the mode, the standard deviation, the maximum, minimum and standard error of the mean; and the confidence limits around the mean.

Cross-tab analysis, which provides a table showing the relationship between two variables such as product usage and income, is one of the mainstays of survey work. As in *SPSS*, *StatPac* gives the num-

(continued)

```
Codebook listing - BOOK

Variable # 1 - Age of respondent
Start coluen = 1    Number of columns = 2    Type = Nueeric
-------------------------------------------------------------
Variable # 2 - Sex
Start coluen = 3    Nueber of columns = 1    Type = Alpha

         M=Male
         F=Female
-------------------------------------------------------------
Variable # 3 - Ethnic origin
Start column = 4    Number of coluens = 1    Type = Alpha

         A=Black
         B=White
         C=Other
-------------------------------------------------------------
Variable # 4 - Annual Income in Thousands of Dollars
Start column = 5    Number of coluens = 3    Type = Numeric

-------------------------------------------------------------
Variable # 5 - Pretest Score
Start coluen = 8    Nueber of coluens = 3    Type = Numeric

-------------------------------------------------------------
Variable # 6 - Posttest score
Start coluen = 11    Number of coluens = 3    Type = Numeric

-------------------------------------------------------------
Variable # 7 - Reading Comprehension Score
Start coluen = 14    Nueber of coluens = 3    Type = Nueeric

-------------------------------------------------------------
Variable # 8 - Math Skills Score
Start column = 17    Number of columns = 3    Type = Nueeric

-------------------------------------------------------------
Variable # 9 - Verbal Ability Score
Start column = 20    Number of columns = 3    Type = Numeric

-------------------------------------------------------------
Variable # 10 - IQ Score
Start column = 23    Number of coluens = 3    Type = Numeric

-------------------------------------------------------------
Variable # 11 - Do you regularly read Newsweek?
Start coluen = 26    Nueber of columns = 1    Type = Alpha

         Y=Yes
         N=No
-------------------------------------------------------------
```

Figure 1: *Sample page from a* StatPac *codebook.*

ber of cases for each cell in the cross-tab table and also three percentages based on the column total, the row total, and the grand total. Unfortunately, you cannot suppress any of these if you want a simpler and less cluttered printout. Chi-square and its associated probability are computed, as well as the contingency coefficient and Cramer's V. (For the meaning of these and related terms, see sidebar, "A Glossary of Statistical Terms," accompanying this article.)

In Figure 3, the same sample used in Figure 2 is broken down by gender and ethnic origin, and the two variables are cross-tabulated. Reading across the first row, we learn, for example, that of the 720 females in the sample, 285 are black, 330

A Glossary of Statistical Terms

Here's a simple word guide to help you master the statistical lingo.

Analysis of variance (ANOVA): A way of assessing the average scores of two or more subgroups to see if the variation between the groups is greater than would be expected on the basis of chance sampling fluctuations.

Chi-square: A statistic often computed for a cross-tabulation to assess how likely it is that the observed relationships shown in the cross-tab table could have occurred merely by random sampling error.

Contingency coefficient: Similar to Cramer's V but less useful since the limiting value is not always +1 but varies depending on the number of rows and columns in the crosstab table (see Cramer's V).

Correlation coefficient: A descriptive statistic that measures the degree of relationship between two variables. The closer the coefficient is to +1, the more closely related are the two variables.

Cramer's V: A measure of the strength of association between two variables in a cross-tab table. Cramer's V can vary from 0 (no relationship) to +1 (perfect relationship). For Cramer's V, the limiting value is always +1, regardless of the number of rows and columns in the table.

Cross-tab: A table that displays the joint distribution of cases on two variables.

Discriminant function analysis: A technique to distinguish different groups based on their patterns of scores on a set of independent variables. In market research, this method is useful to compare users of different brands in terms of their needs, attitudes, perceptions, product usage habits, and so on.

Factor analysis: A data reduction technique to see if a small number of general characteristics or factors can account for the relationships among a larger group of variables. It can be used, for example, to identify basic underlying attitudes, perceptions, or personality traits.

Frequency distribution: A listing of the number of cases that fall into each category or value of a variable.

Mean: The measure of central tendency commonly called the "average."

Median: The numerical value of the middle case, once all cases have been rank ordered from highest to lowest. Unlike the mean (or average), the median is not strongly affected by the existence of atypical extreme cases at either the high or low end of the distribution.

Mode: The value of the variable that occurs most often. It is possible, though not usual, for a frequency distribution to have more than one mode.

Multiple correlation coefficient (multiple R): A measure of the degree of association between a variable of interest and a predicted score for that variable based on a set of other variables (see multiple regression).

Multiple regression: A technique for predicting scores on the variable that the analyst is primarily interested in based on the pattern of scores on a set of two or more other variables. The variable to be predicted is called the dependent variable. The various predictor measures are called the independent variables. Multiple regression can be used quite powerfully for causal analysis as well as for prediction.

One-tailed significance test: Used to test the researcher's explicit prediction that, on some variable, a specified group will be reliably higher than another group. It is legitimately used when testing a rigorously derived prediction or in go/no-go situations such as pharmaceutical or engineering tests designed to see if a proposed new product is superior to an existing product. The test is invalid for the vast majority of survey research situations, which do not involve committed prediction.

Scatter diagram (or scattergram): A graphics plot showing the relationship between two variables.

Standard error of the mean: The estimated standard deviation of the mean scores of an infinite number of samples of the size and character of the sample used in the study in question. Used to assess the extent to which the observed mean of the sample might deviate from the usually unknown true population mean.

Standard deviation: A statistic to describe amount of variation in a given population on a particular variable.

t-test: A test to assess whether an observed percentage or average-score difference between two groups is greater than what could be expected on the basis of random sampling error.

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```
StatPac Demonstration

FREQUENCY DISTRIBUTION: GENDER

                Sex                          Number    Percent
-------------------------------------        ------    -------

                F = Female                    720       35.0 %
                M = Male                     1335       65.0 %
                                             ------    -------
                 Total                       2055      100.0 %

                 Missing cases = 0
                 Response percent = 100.0 %

StatPac Demonstration

FREQUENCY DISTRIBUTION: ETHNIC ORIGIN

            Ethnic origin                    Number    Percent
-------------------------------------        ------    -------

                A = Black                     660       32.1 %
                B = White                    1140       55.5 %
                C = Other                     255       12.4 %
                                             ------    -------
                 Total                       2055      100.0 %

                 Missing cases = 0
                 Response percent = 100.0 %
```

Figure 2: *Frequency distribution tables for two demographic variables.*

are white, and 105 are "other." From the first column, we learn that 39.6 percent of all the females are black; 43.2 percent of all the blacks are female; and black females constitute 13.9 percent of the total sample. Similar interpretations can be made for the other table values by column and row.

If you want a close look at the relationship between two measures, *StatPac*'s correlation program will print out an attractive and fully annotated scatter diagram plus a set of statistics.

Figure 4 is an example of a scatter diagram that plots reading comprehension scores against annual income. The interpolated line of best fit, which depicts the relationship of the two variables visually, is indicated by the pattern of three horizontal dots sloping positively from left to right. The two variables are related positively, as the slope of the line suggests: As annual income rises, reading comprehension scores increase. Cases appear as asterisks, with each asterick representing more than one case.

Unfortunately, *StatPac* falls into the same trap as SPSS when producing correlations. The default condition in SPSS prints out only one-tailed significance levels, which are, of course, grossly inappropriate except under the most rare research circumstancs. Over the past decade, it is likely that thousands of SPSS users have been unaware of the actual default setting and have been misled by this error of judgment within SPSS. *StatPac* does not even offer a choice, but gives one-tailed significance levels only and without any warning to the user. (It should be noted that this problem does not occur in the t-test procedure, where both one- and two-tailed results are given.)

To obtain a correlation matrix in *StatPac* rather than a single coefficient, you must use the roundabout procedure of invoking the multiple regression program while suppressing all options except that for the single correlation matrix. This extremely useful capability is quite easy to do and works very well, but it is not brought to the reader's attention in the manual.

The multiple regression program is exceptionally useful and can handle up to 30 independent variables. A full set of output options is offered, including multiple R and its F-ratio; both B and beta coefficients with their significance levels; the standard error of the estimate; means and standard deviations for all variables; the simple, partial, and inverse correlation matrices; and a listing or partial listing of observed, expected, and residual scores. The stepwise regression procedure is not provided.

Other analytic programs in *StatPac* include the t-test for both independent or correlated data, one-way analysis of variance, and multiple variable response for convenient one-page summary output when a number of variables all have the same response categories.

> The multiple regression program can handle up to 30 independent variables.

Execution Time

To find out how long it takes to execute the various analytic programs in *StatPac*, I made use of the data set for Figures 1 through 4, which consists of 2,055 survey

respondents, a fairly typical sample size for nationwide survey studies. Figure 5 shows that ordinarily, apart from multiple regression, a *StatPac* task will usually take about 3 to 5 minutes to run, including both execution time and the printing out of the table on an IBM printer. Descriptive statistics takes somewhat longer because the data must be sorted to determine the median. As shown in Figure 5, most of these tasks can be speeded-up with the use of a RAM disk. The 10 minutes required to produce a table for the multiple regression task without a RAM disk was reduced by 40 percent by the use of a RAM drive for the data storage disk. These times can be improved even further by putting both the system execution disk and the data disk on RAM drives and by making use of a print spooler. According to Walonick Associates, there should be no appreciable difference in execution time for multiple regression problems with a larger number of independent variables, since computations are performed as the data are being read.

Even though the *StatPac* execution times are slow compared to those of a mainframe, overall turnaround time may be better. In a large organization, your work may have a low priority compared to

Even though the StatPac execution times are slow compared to those of a mainframe, overall turnaround time may be better.

that of the corporate payroll or product-forecasting departments, for instance, and may well be delayed a number of hours before it's printed out. Then if you discover that you made a mistake and ordered the wrong tables in the first place, you queue up for another long wait. The situation is often much worse when dealing with an outside service bureau where you might have to wait for 2 or 3 days before finding out that the service rep misunderstood your request for tabulations during a hurried telephone conversation.

```
StatPac Demonstration

            CROSSTABULATION: GENDER BY ETHNIC ORIGIN

                        Ethnic origin - (X Axis)
    - - - -  BY  - - - -
                        Sex - (Y Axis)

          Number    I Black  I White  I Other  I
          Row %     I        I        I        I
          Column %  I        I        I        I Row
          Total %   I   A    I   B    I   C    I Totals
          ----------I--------I--------I--------I--------
                    I  285   I  330   I  105   I
Female        F     I 39.6   I 45.8   I 14.6   I  720
                    I 43.2   I 28.9   I 41.2   I 35.0
                    I 13.9   I 16.1   I  5.1   I
                    I--------I--------I--------I--------
                    I  375   I  810   I  150   I
Male          M     I 28.1   I 60.7   I 11.2   I 1335
                    I 56.8   I 71.1   I 58.8   I 65.0
                    I 18.2   I 39.4   I  7.3   I
                    I--------I--------I--------I--------
          Column    I  660   I 1140   I  255   I 2055
          Totals    I 32.1   I 55.5   I 12.4   I 100.0


          Chi-square              =  42.03   Valid cases    =  2055
          Degrees of freedom      =  2       Missing cases  =  0
          Probability of chance   =  0.000   Response rate  = 100.0 %
          Cramer's V              =  0.143
          Contingency coeff.      =  0.142
```

Figure 3: *Cross-tabulation table showing the breakdown of males and females for three ethnic categories in the demonstration survey sample.*

Improving the Product

Promised for the next version of *StatPac* is a breakdown program to produce various subgroup means; an aggregate program to permit operations on summary data; two-way ANOVA, nonparametric statistics; and a new data entry system that will feature full-screen editing and data entry validity checking against permissible values specified by the codebook. The next version will also allow you to end output to disk so *StatPac* tables can be edited and formatted by a word processor.

Based on my personal experience, all signs indicate that Walonick Associates has an unusually responsible attitude toward its customers. During the few months that I have had this package, customers received a number of bug reports and were able to obtain upgrades on a disk exchange basis. Beginning January 1, however, the company began charging a nominal free for upgrades (less than $30).

Any user of *StatPac*, who has worked extensively with *SPSS* or similar mainframe systems is likely to have a rather lengthy wish list. Factor analysis, discriminant function analysis, and the capability to do graphics beyond just a scatterplot are my own particular priorities. Data entry verification and the ability to weight cases to adjust for known demographic biases in the sample would also be welcome features. On the whole, however, *StatPac* is a flexible and a well-designed tool. It is professionally crafted, comfortable to use, does all the basic survey analytic tasks, and does them well. ■

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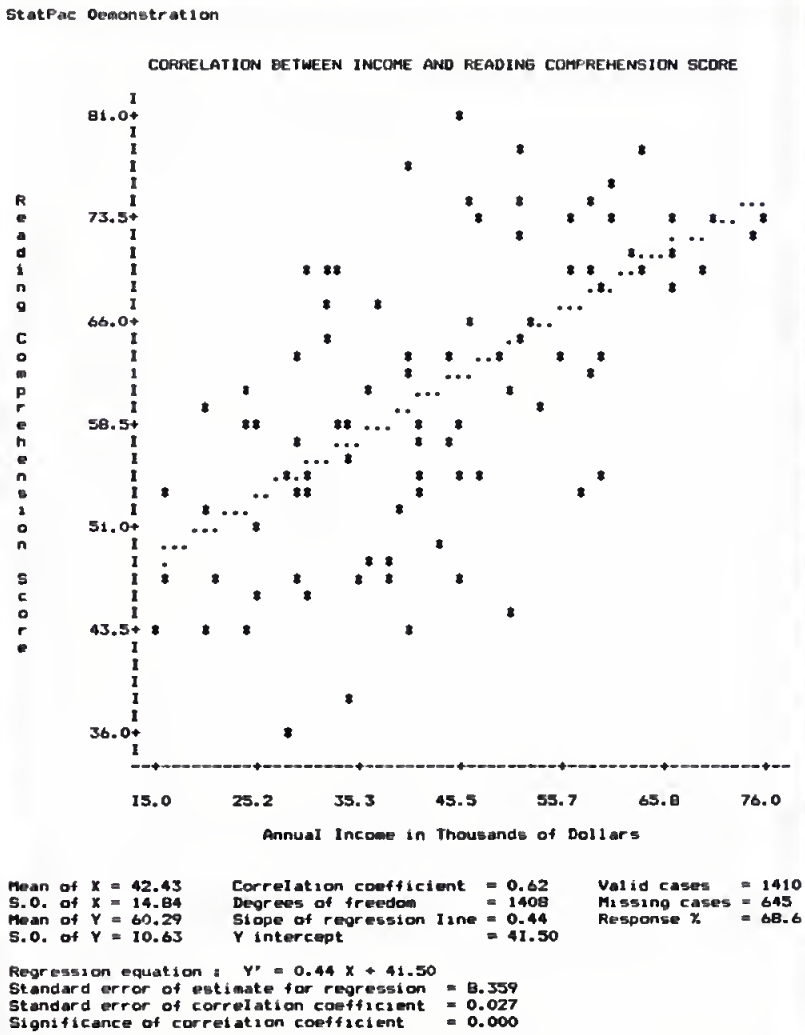

Figure 4: *Correlation scattergram showing that reading comprehension score is related to income. The line of best fit is also plotted.*

Analysis Task	Without RAM Disk	With RAM Disk
Frequency distribution	2.8	1.9
Descriptive statistics	6.6	5.5
Crosstabs and chi-square	4.0	2.8
Correlation and scattergram	5.1	3.3
T-test for independent observations	4.3	2.6
T-test for paired observations	4.6	2.8
Multiple linear regression using three independent variables (basic statistics and simple correlation matrix)	10.0	6.1

Figure 5: *Time in minutes to execute and print various StatPac analysis tasks.*

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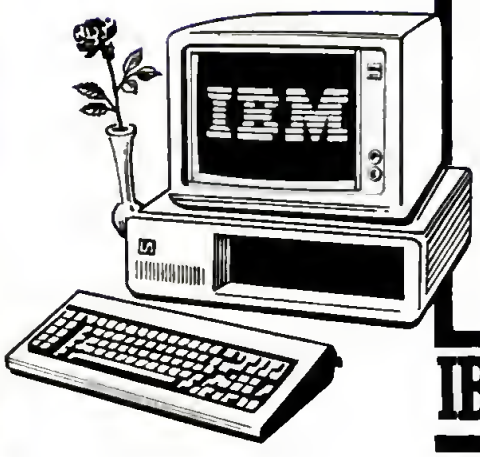

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CIRCLE 288 ON READER SERVICE CARD

Inside The IBM Museum

Big Blue's new office in New York City includes the IBM Gallery of Science and Art, showcasing works of art and scientific exhibits from computer history.

Ever since works of art purchased by Thomas Watson, Sr. were exhibited at the New York World's Fair in 1939, IBM has been involved with the arts. Over the years this corporation has funded many exhibits that have appeared in American museums.

In October, IBM inaugurated its new Manhattan office building. Within it is a bamboo-filled oasis in midtown Manhattan, called the IBM Garden Plaza, and a new museum, the IBM Gallery of Science and Art. This gallery will present science exhibits created by IBM and art exhibitions that would not otherwise have come to New York. Admission to the gallery is free to the public. It is open Tuesday through Friday from 11 a.m. to 6 p.m., and Saturday from 10 a.m. to 5 p.m.

Visitors are shaded by bamboo trees in the glass-enclosed IBM Garden Plaza.

"Innovation in IBM Computer Technology," the first exhibition in the IBM Gallery of Science and Art, displayed computer devices from the past five decades. Many of these examples have not been shown to the general public before.

The next exhibits to appear in the IBM Gallery will be "Paintings and Drawings from the Phillips Collection" (including Renoir's "The Boating Party") and "Reflections of Faith," an exhibit organized by New York's Museum of Folk Art. These will be on display through January 21, 1984.

IBM has assembled one of the world's finest collections of historical calculating machines and related artifacts. A special gallery in IBM's Manhattan office now presents an exhibit from this collection, called "A Calculator Chronicle: 300 Years of Counting and Reckoning Tools." I. Bernard Cohen of Harvard University was IBM's consultant for creating the exhibit. Visitors must arrange appointments to see this exhibit by calling (212) 407-6212. *(continued)*

Photographs: Roberto Sandoval

1 Professor I. Bernard Cohen of Harvard (left) tells managing editor Barry Owen about the Schuetz Difference Engine, the first printing calculator, made in Sweden in 1853.

2 A Holorith Tabulating Machine built in 1890 to tabulate the results of that year's national census.

3 The IBM 2314 disk storage system used with the IBM 360, the major system of the 1960s. This unit has four disk packs, each with 25 million characters of storage. The pile of paper behind this hardware is a printout—not quite complete—of the 360's operating system.

4 The IBM Kanji keyboard, developed in 1979, has 254 keys, each with at least 12 characters. This is a standard device used to input Japanese texts to be printed or displayed.

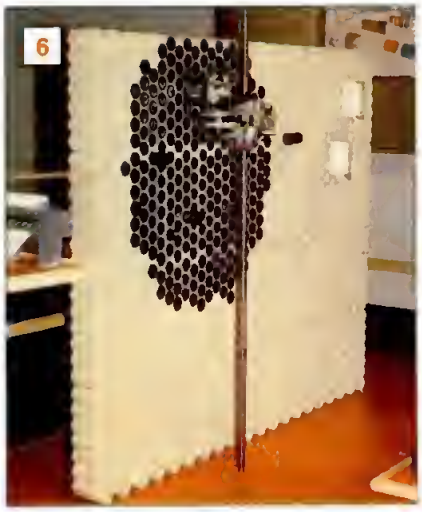
5 The large machine is a Thomas Piano Arithmometer, constructed for the Paris Exposition of 1855. This elegant device was the first calculator to be produced commercially.

6 Part of the IBM 3850 mass storage system, which was introduced in 1976. Each hole in the honeycomb panel contains a cartridge with a reel of magnetic tape that holds 50 million characters of information. The moving picker arm can access any cartridge and transfer its data to a disk for on-line use.

7 A memory array for the IBM 705, produced in the late fifties. This device provided 280,000 bits of storage in tiny magnetic cores, which IBM manufactured with adapted pill-making machinery.

8 The IBM 3340, produced in 1973, was the first device to use Winchester disk technology. These disks could store over 1.7 million bits per square inch, twice the density of previous disks. ■

3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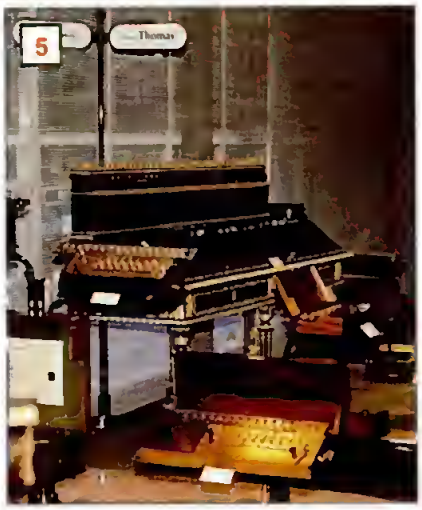
4
Kanji keyboard

7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CIRCLE 204 ON READER SERVICE CARD

A VisiCalc Start-Up Planner

Business executives can prepare for the start-up of new branches, departments, and markets, and monitor sales staff, with the aid of this versatile spreadsheet program.

The following material is reprinted from Chapter 13 of *Executive VisiCalc for the IBM Personal Computer* by Roger E. Clark, published by Addison-Wesley Publishing Company. The book explores *VisiCalc* and suggests a myriad of unique business applications for this program. This chapter puts *VisiCalc* to use in planning business start-ups.

The author, Roger E. Clark, describes himself as a "*VisiCalc* maven." He has worked as a dealer in one of the earliest computer stores and as a partner in a management/marketing consulting firm. He cofounded Intercalc, a *VisiCalc* users group.

Planning ahead occupies a lot of executive time in companies large and small. Often this outlooking to the future is dependent on interrelated events. In this chapter, we are going to develop a useful function: that of being able to change the start date of an event with one keystroke, and immediately seeing the result of the change on other, related activities. The principle is fairly simple, and while our example is going to be equally simple, you should be able to see many extensions of the function for your business.

Executive VisiCalc for the IBM Personal Computer
Roger E. Clark
Addison-Wesley Publishing Company
138 pages; $12.95
ISBN 0-201-10243-9

CIRCLE 701 ON READER SERVICE CARD

In Figure 1 you will see two layouts, apparently of the same information. However, the top one, . . . from rows 12 to 24, deals only with evaluating the months and the start dates, while the bottom half is the actual report that would be printed out, which contains the implications of the start dates and their manipulations.

Our hypothesis here is the planning for the opening up of some eastern markets by a company, let's say for a test market. Since the hiring of new people is such a chancy thing, we want to be able to examine the contribution in revenue depending on the order in which the new salespeople are found, trained, and go to work. It is assumed that the sales department has given us the forecast for each market, the going rate of sales that can be expected when the market is up to speed. We want to factor in a somewhat slower rate of sales for the first few months, when the salesperson is also getting set, and then we want to be able to adjust the start dates according to the way the hiring is going.

The first column contains the dynamic figures, the ones you play with; they represent the start month, January being 1 and so on. We will go through a cycle, just to see what happens, and the formulae that give the result. As you can see it is working okay, as in our illustration we have

projected each of the eight markets being hired one after the other a month apart. You can observe that New York, planned to open in month 1, has that indication in January; similarly, Buffalo, planned for August, has its 1 under that month.

The second column contains the sales department figure for the going rate of sales expected from the markets when up and running. Note one other thing: above the month label is a value entry, the month number. This is required for the formula that does this little task of carrying out the start date. The first formula that does this, taken from location D17, is:

```
@IF(D14=A17,D14,0)
```

Narrative: If D14, the month number above, is equal to the start month selected in A17, then carry over the start month, otherwise insert zero. As you can see, the effect on Albany will be the latter.

In E17, the formula is . . . different:

```
@IF(E14=A17,1,
  @IF(D17<1,0, D17+1))
```

Narrative: If the month number from above equals the selected start month, label it as 1, otherwise evaluate the @IF statement. This looks at the preceding month for an indication that the city has already started, and the value is greater than 1. If "no" it inserts zero, but if "yes" it just adds one to the preceding figure.

So this part of the model is doing the job of identifying the start month for each city, and labelling the succeeding months once it has done so. In the report part of the model, the formulae examine the corresponding locations in the top, and act upon them. It is here that we handle the different rate of sales to be expected while the new salesperson is "ramping up" the territory. In Figure 2 there is a LOOKUP table, and we have entered it so that we could, if we wished, assign not only the percent of going rate for start-up months, but also any other variations in rate of sale—perhaps a seasonal variation, for instance.

A different rate of sales is to be expected while the new salesperson is "ramping up" the territory.

The first two columns are simply "bring downs" of the values from above, so that they get printed out in the report. The formula in D33 is:

```
@IF(D17<=5,B33*
  @LOOKUP(D17,R14...R26),B33)
```

Narrative: If the value assigned to this month in the top matrix is less than or equal to 5 (indicating that it is indeed one of the first four months), multiply the going rate of sales found in B33 by the result of looking up the start month in the table. The fifth month, the first "going" month, will find a multiplier of one, and therefore will in effect bring over the going rate. If D17 is greater than five, then the going rate is similarly brought over.

And that's it. You can change the start months in the first matrix and watch the effect on the total regions that result from one city's slipping or accelerating its activities. We have divided the two functions into two separate parts for illustration pur-

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
12	Start month evaluator														
13															
14	HIRE	Going	CITY	1	2	3	4	5	6	7	8	9	10	11	12
15	MONTH	sales		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
16															
17	1	110000	NEW YORK	1	2	3	4	5	6	7	8	9	10	11	12
18	2	46000	ALBANY	0	1	2	3	4	5	6	7	8	9	10	11
19	3	82000	BOSTON	0	0	1	2	3	4	5	6	7	8	9	10
20	4	58000	PHILA	0	0	0	1	2	3	4	5	6	7	8	9
21	5	76000	NEWARK	0	0	0	0	1	2	3	4	5	6	7	8
22	6	41000	HARTFORD	0	0	0	0	0	1	2	3	4	5	6	7
23	7	38000	STAMFORD	0	0	0	0	0	0	1	2	3	4	5	6
24	8	53000	BUFFALO	0	0	0	0	0	0	0	1	2	3	4	5
25															
26	TERRITORY EXPANSION ANALYSIS														
27															
28															
29	Scheduled	Going													TOTAL
30	HIRE	Monthly	CITY												
31	MONTH	SALES		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	CONTR.
32															
33	1	110000	NEW YORK	16500	27500	60500	93500	110000	110000	110000	110000	110000	110000	110000	110000	1070000
34	2	46000	ALBANY	0	6900	11500	25300	39100	46000	46000	46000	46000	46000	46000	46000	404800
35	3	82000	BOSTON	0	0	12300	20500	45100	69700	82000	82000	82000	82000	82000	82000	639600
36	4	58000	PHILA	0	0	0	8700	14500	31900	49300	58000	58000	58000	58000	58000	394400
37	5	76000	NEWARK	0	0	0	0	11400	19000	41800	64600	76000	76000	76000	76000	440800
38	6	41000	HARTFORD	0	0	0	0	0	6150	10250	22550	41000	41000	41000	41000	202950
39	7	38000	STAMFORD	0	0	0	0	0	0	5700	9500	30000	30000	30000	30000	167200
40	8	53000	BUFFALO	0	0	0	0	0	0	0	7950	53000	53000	45050	53000	212000
41																
42			MONTHLY TOTAL	16500	34400	84300	148000	220100	282750	345050	400600	504000	504000	496050	504000	3539750

Figure 1: *A start-up planner for a business that is opening up some new eastern markets.*

poses. It would be possible, of course, to enter a more complex formula and have both the identification of the start month and the calculation of revenue done at the same time.

Using this methodology, you can manage the start-up of new machines, new branches, the addition of new people to a department, the effect on expenses of buying new vehicles—anything that you want to examine in the light of slippage or acceleration of the start date. Naturally, it can also be adapted to a daily schedule as well as a monthly one, as we have done.

Now let's look at some extra utilities—we will demonstrate them on the above model and leave it to you to figure out how you can adapt them to your purposes—all of them are useful and functional.

VisiCalc as a Display Tool

In one company for whom we have done consulting, the market research department regularly gets together to review results of studies, in order to get group input to the eventual recommendation they are going to make. Their analysts all have IBM PCs, and they do much of their statistical work using the *VisiCalc* program. When they get together, the conference room has one PC for the presenter, and multiple screens so that the others can see the output (for management presentations, they have a projection TV setup).

Some of the following suggestions are most suitable for this purpose, as they enable one to manage the presentation of material quickly and effectively. Our first suggestion allows you to examine the combinations of several different variables in a model without having to change them separately, a couple of keystrokes does it.

Multiple Variables

Let's say that we know four specific ways in which the hiring may get implemented among the eight cities in our model, four different patterns of hiring. Look at Figure 3. As you can see it occupies the very top of the model (did you wonder why we started the previous examples at row 12?) You can see our cities, and five columns representing options. At the bottom is a line called SELECT—, and you can see an asterisk sitting beneath OPTION 1. You will remember that if a location is formatted to/F*, each unit of an integer value is represented by an asterisk; therefore, this asterisk indicates that there is a "1" sitting there. The formula in the column called TRANSFER is:

```
@IF(D10=1,D2,
   @IF(E10=1,E2,
   @IF(F10=1,F2,
   @IF(G10=1,G2,
   @IFH10=1,H2,0))))
```

This is a super example of a nested @IF statement—seems to go on forever! The narrative is really very simple, since all it is doing is stepping through the SELECT locations looking for a 1, and when it finds one carrying over the value in the column above it. Just read it again and you will see how it does it. Narrative: If D10 is one, bring over D2, if not look at E10. If E10 is one, bring over E2, and so on.

So you load up the option columns with your pre-selected combination of opening dates, and by just blanking or making zero any asterisks that are already there and substituting another, you can move the selected column over to TRANSFER. The first column in the Start Month Evaluator section now brings down the corresponding entry from TRANSFER. Once again, all of this could have been accomplished in A17, but the formula would have been complicated—if you have the space, do it our way.

If your model is set to/GOC (re-calculate by column), you will need an extra !Recalc to initiate the change. The *VisiCalc* program will not have done the TRANSFER column when it does column A, so it will need to "take a second look" with a recalc to transfer the value down. Of course, if the /GO makes no difference in your particular application, by all means set it to ROWS and avoid this (you will see later why we had to have ours set at columns).

You will find lots of applications for this idea. When there are a group of variables in a model, and they do not fall neatly in one location, it can be most annoying to prepare reports and find (at the presentation naturally!) that one or other of the variables did not get changed. Also, when developing material and you want to swap back and forth examining different variable environments, this method makes it easy.

Finally, in a presentation you can also

0	0
1	0.15
2	0.25
3	0.55
4	0.85
5	1
6	1
7	1
8	1
9	1
10	1
11	1
12	1

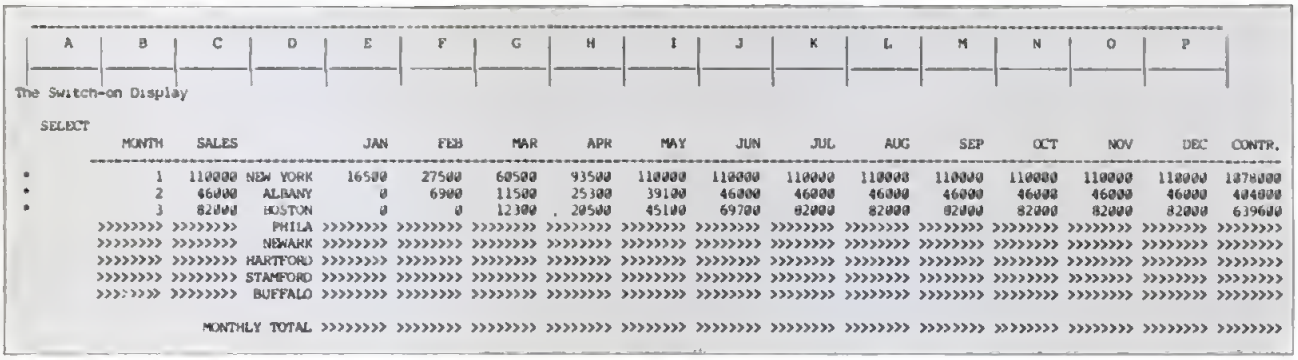
Figure 2: *A @LOOKUP table for the going rate for starting months.*

	A	B	C	D	E	F	G	H	I	J
1				OPTION 1	OPTION 2	OPTION 3	OPTION 4	ZERO	TRANSFER	
2			NEW YORK	1	0	2	5	0	1	
3			ALBANY	2	7	0	6	0	2	
4			BOSTON	3	6	3	1	0	3	
5			PHILA	4	5	7	7	0	4	
6			NEWARK	5	4	1	0	0	5	
7			HARTFORD	6	3	6	2	0	6	
8			STAMFORD	7	2	5	4	0	7	
9			BUFFALO	0	1	4	3	0	0	
10			SELECT-->	*						

Figure 3: *The variable options for the eight cities in the model.*

dynamically review the implications of change for the audience—and that is the reason for the column of zeros up there in the options columns. It turns the whole model to zeros!

In a presentation it is always annoying when you have distributed handouts to the audience to find that some of them have got ahead of you in the material; and when using overhead projectors you need some dexterity in smoothly moving the masking sheet of paper down a chart so that you can review it one line at a time. We have a way of doing this with the *VisiCalc* program that is very smooth and orderly. Look at The Switch-on Display in Figure 4. What we have done is to completely duplicate the format outline of our model beneath the original. This is the area we will be using to present our material. Note the column at left called SELECT, and the asterisks. Each location in this column is a "switch." If there is a one there, the row is switched on for review, while the



The Switch-on Display

SELECT	MONTH	SALES		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	CONTR.
*	1	110000	NEW YORK	16500	27500	60500	93500	110000	110000	110000	110000	110000	110000	110000	110000	1870000
*	2	46000	ALBANY	0	6900	11500	25300	39100	46000	46000	46000	46000	46000	46000	46000	484000
*	3	82000	BOSTON	0	0	12300	20500	45100	69700	82000	82000	82000	82000	82000	82000	639600
	>>>>>>>>	>>>>>>>>	PHILA	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>
	>>>>>>>>	>>>>>>>>	NEWARK	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>
	>>>>>>>>	>>>>>>>>	HARTFORD	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>
	>>>>>>>>	>>>>>>>>	STAMFORD	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>
	>>>>>>>>	>>>>>>>>	BUFFALO	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>
			MONTHLY TOTAL	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>	>>>>>>>>

Figure 4: *This model helps facilitate smooth and orderly presentation of the material to an audience.*

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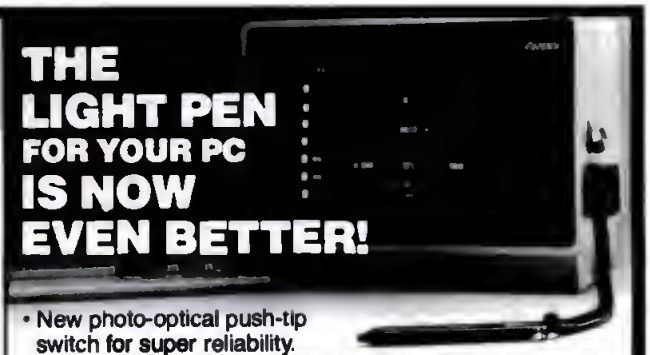

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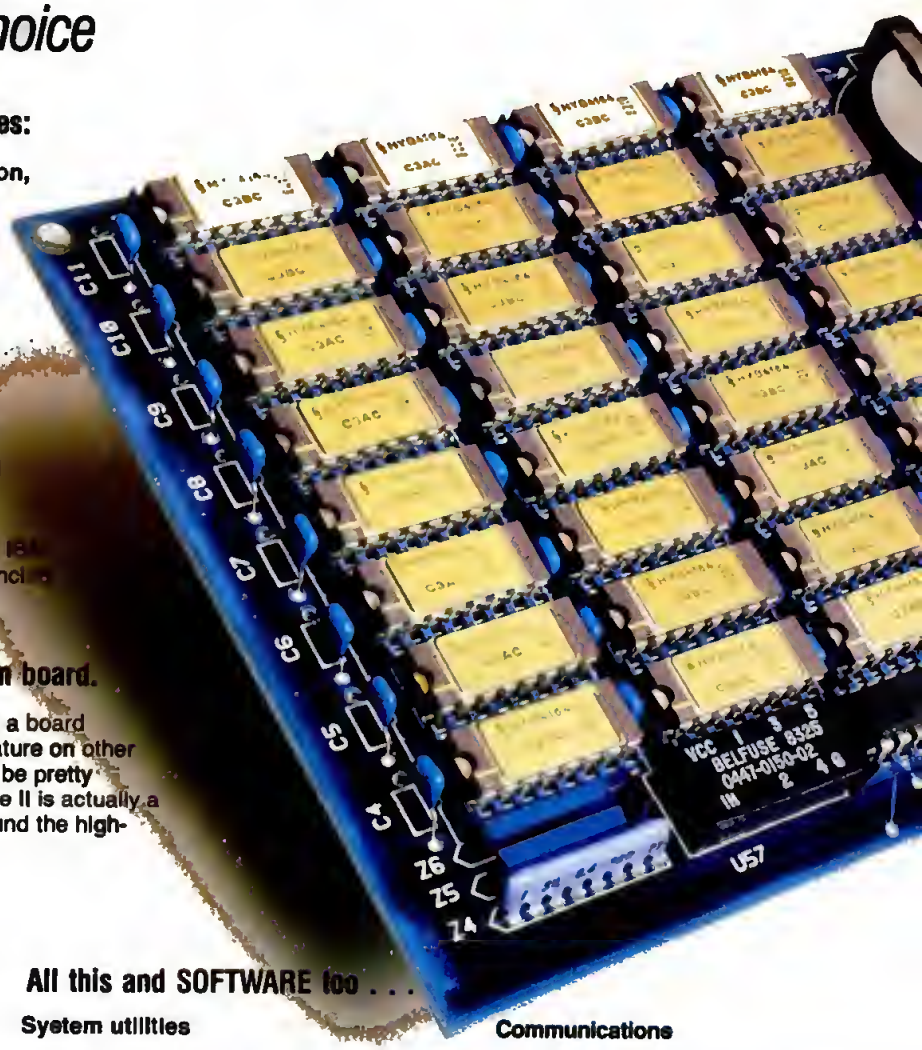

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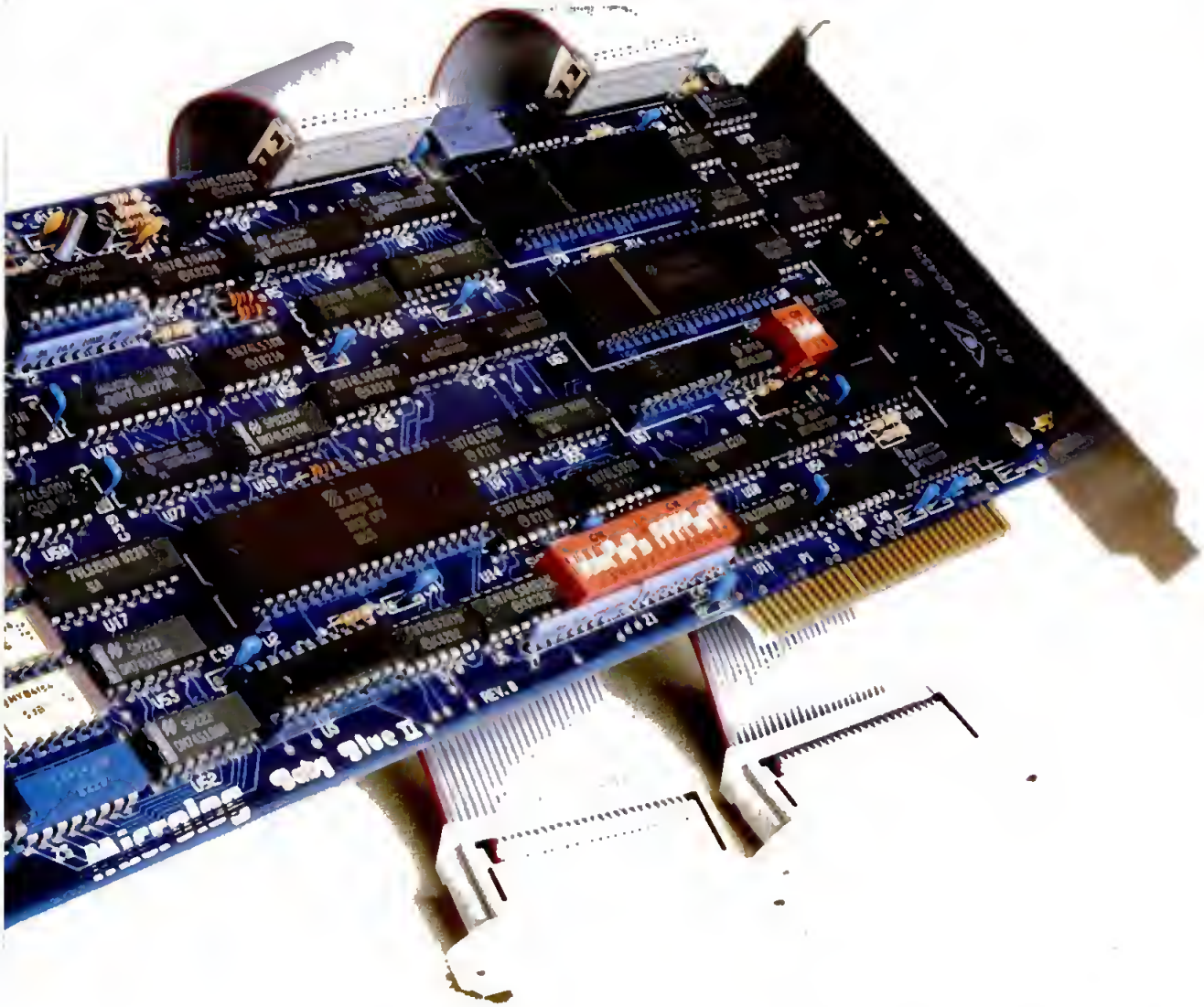

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remainder of the model is concealed with lopsided chevrons. We are, of course, using the feature of the *VisiCalc* program that inserts this row of "greater than" symbols to indicate that the location has overflowed with a value too large to be displayed.

It is useful when you have long columns of figures to be able to identify the largest.

The simple formula in every location is

```
@IF(Switch=1,value,1000000
000)
```

Narrative: @IF(asterisk is there, insert value from the original matrix, otherwise insert one billion!).

Now, with absolute cool, one can switch on the first line, review it for the audience, add the next line, and so on. There is one problem with this method—any vertical@SUMS are not going to "switch on" until all the components have come on. The presence of even one billion in the column above them won't let them. This can be solved, however, with an @IF statement. Can you figure it out?

Identifying the Biggest

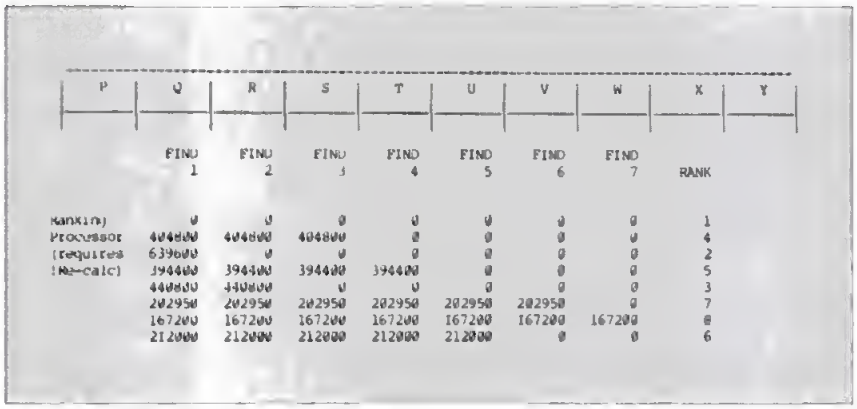
It is very useful when you have long columns of figures to be able to identify the largest, or the top four, or even add a ranking according to size. This is especially useful in an application like our illustration model when the "winner" can change with every change in the start month sequence. In a presentation, to have the top numbers highlighted makes it easier to explain them or see the effect a change has had.

In Figure 5 you can see a section of the model that would be placed to the right of the area that produces the figures to be ranked. The process is one of eliminating in successive columns the top value in the preceding column, until you are left with none. For this we use the @MAX function in the *VisiCalc* program.

The formula in the first location in the FIND 1 column is

```
@IF(P33=@MAX(P33 . . . P4
0),0,P33)
```

Narrative: If the value in the preceding column is the largest (@MAXimum) then insert zero, otherwise just move the value forward. As you can see in FIND 1, the largest value in the preceding column (the original TOTAL CONTR.) has disappeared and has been replaced with zero. Each FIND column performs the same function on the preceding column (don't try and /Replicate the first column if, like us, it is some distance away from the Ranking Area because your "Relatives" won't work in the succeeding columns. You can of course /Replicate the second column, FIND 2, when you have structured it).



	P	Q	R	S	T	U	V	W	X	Y
		FIND 1	FIND 2	FIND 3	FIND 4	FIND 5	FIND 6	FIND 7	RANK	
Ranking		0	0	0	0	0	0	0	1	
Processor		404800	404800	404800	0	0	0	0	4	
(requires		639600	0	0	0	0	0	0	2	
Re-calc)		394400	394400	394400	394400	0	0	0	5	
		440800	440800	0	0	0	0	0	3	
		202950	202950	202950	202950	202950	202950	0	7	
		167200	167200	167200	167200	167200	167200	167200	8	
		212000	212000	212000	212000	212000	0	0	6	

Figure 5: *This section of the model produces the figures to be ranked.*

The formula in the RANK column is

```
(@SUM(S33 . . .Y33)/P33)+1
```

Narrative: Add the row across, divide by the original value (which will tell us how many columns it appeared in) and then add one. This last addition is necessary because we found the largest right away, in FIND 1, and therefore there is a row of zeros for it.

Just to demonstrate a practical use for the function you can see in Figure 6, we have added a couple of columns to our original model, called RANK and PRIZE FUND. We carried over the rank from the Ranking Processor, and displayed the top four by using one asterisk for the top, two for the second, and so on. This was done with the following formula, which needs no narrative:

```
@IF(Rank<=5,0,Rank)
```

The prize fund is an amount intended to pay the four winning territories. (I know it's not fair on late starters, but I just wanted to illustrate a use to which a ranking could be put, and also use @CHOOSE, which we have neglected a bit. You can figure out a sensible way to use it when you add it to a model in your own PC!)

What we have done is decide that the winning salesperson will get a bonus of 2% of territory sales, the second 1.5%, third 1.0% and fourth half a percent. The formula is:

```
@IF(Rank>.99,P58*@CHOOSE
(Rank,.02,.015,.01,.005),0)
```

Narrative: If the Rank is greater than .99 (which will eliminate all those unranked), multiply the territory sales by the value @CHOOSEd using the rank as an index. In the case of 1, we will multiply by .02, 2 by .015 and so on.

These last utilities were all developed

by *VisiCalc* program users in the course of their daily work. They were "discovered" by the user having a need for an end result, and making the program do it. We sometimes feel that there is nothing the *VisiCalc* program cannot do, as we tackle new and different requirements. An exaggeration of course, but there is much that the program can do that at first glance seems impossible. The secret lies in being completely comfortable (dare we say expert?) in all the *VisiCalc* functions, to the point that you can review each of them in your mind when seeking an end result. ■

Excerpted from Executive VisiCalc for the IBM Personal Computer *by Roger E. Clark copyright ©1983, by permission of Addison-Wesley Publishing Co., Inc. All rights reserved.*

```
                    !Recalc required
                    for Rank & Prize

                TOTAL                PRIZE
      DEC      CONTR.      RANK      FUND
-----------------------------------------
   110000    1078000 *              21560
    46000     404800 ****            2024
    82000     639600 **              9594
    58000     394400                    0
    76000     440800 ***             4408
    41000     202950                    0
    38000     167200                    0
    53000     212000                    0

   504000    3539750                    0
```

Figure 6: *A practical use: salespeople are ranked and the four winning territories receive prizes.*

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Fancy Printing With Fancy Font

SoftCraft has produced a software package that will allow you to transform your inexpensive Epson printer into an advanced dot matrix machine.

The new advanced dot matrix printers provide near letter-quality print, which (if you don't look too hard) is practically indistinguishable from that of the daisy wheel typefaces. These machines also produce draft-quality dot matrix type, which though less readable, is generated at a much higher speed. However, dual-purpose high-density matrix printers cost up to $2,000 or more, and many users may not want to make the investment. Those of you who own inexpensive printers now have an alternative—a program from SoftCraft called *Fancy Font*. Written in C language, this software system is a "personal typesetter" that transforms an Epson printer into an advanced dot matrix machine with remarkable flexibility and sophistication. It takes advantage of the ability of the Epson printer to space vertically at 1/216-of-an-inch intervals and passes the printhead across each line about six times to achieve the "letter-quality" look. The price you pay is speed. It takes about 8 minutes to produce a 40-line page using *Fancy Font* with an Epson MX. But the result is letter-quality print that is as good as or better than that of the $1,000 advanced dot-matrix machines.

Fancy Font
SoftCraft
8726 Sepulveda, #1641
Los Angeles, CA 90045
(213) 821-8476
List Price: $180
Requires: 128K RAM, two disk drives, Epson or IBM dot matrix printer.

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Fancy Font also has the ability to print in many different fonts and to generate special characters. (A font is a set of alphanumeric characters of a particular typeface and size.) You can add foreign characters to each of the already-prepared type sets, called font files, that are included in the software or create your own fonts from scratch. *Fancy Font* also has powerful formatting abilities.

The program comes on four single-side diskettes, which provide 19 different files of 95-character ASCII fonts, which you can use as they are or modify in any way you choose. Nine additional partial fonts (upper and lower case alphabetics), a huge (97,922-byte) database of miscellaneous characters, and three programs, Pfont, Efont, and Cfont, which print, edit, and create fonts, respectively, are included.

Mix and Match Fonts

To use *Fancy Font* for printing, you write text with any word processor and embed single characters with a backslash (\), which will control formatting. You can select up to ten different fonts per print run. The embedded format instructions include those for underlining, line centering, flushing a line to right, setting line justification on and off, moving to top of next page, moving down a given distance from current position, moving to a given vertical position from top of page, moving to next tab, spacing to the right horizontally by 1/120 of an inch, spacing right a certain distance from the current position, inserting in the text up to ten different strings or current page number or current filename, and few other indicators. Using the word processor, you format the text to the number of characters you want in a printed line. Then save the text to a file and print it with Pfont. This program's interactive mode will prompt you with questions, or you can give the program a command line in DOS, such as

```
[A> Pfont B:TEXT.TXT +F0
ROMNB18 ROMN12 OLDE11 +NF
+TB.5 +LM.75 +LW7.5+SP .2
+HL "\F2Zander\c\s#\r\uFancy
Font\u"+RD 1]
```

This example tells the printing program to print B file TEXT.TXT using 18-point Roman bold where indicators for font number 0 are embedded in the text, 12-point Roman as font 1, 11-point Olde English as font 2. It also tells it not to put a header line on the first page, to tab .5 inch, to create a left margin of .75 inches and a line width of 7.5 inches, to space .2 inches between each line, to use a header line printed in font 2 with my name on the left, to center the page number and to flush right the underlined words *Fancy Font*, and finally, to print the program in the second fastest rough draft mode. Command lines can get very long and typing them accurately is tedious if you wish to specify a large number of the 26 possible formatting parameters as something other than their default values. The command lines themselves can be saved as files to be invoked again, and you can add or delete parameters as you perfect your print job in the draft mode. The command line then would be given simply as a reference to the command file:

```
A> Pfont <B:TEXT.FFI.
```

Additional command parameters include those for footing line strings, (strings of words that can be substituted in text by inserting the letter *s* after the backlash indicator) and controlling top and bottom margins, heading and footing margins between top of page and string, total page length, pause between pages for insertion of paper. They also control the use of Epson fonts (you can embed indicators for any of the nine), and formfeeds, and allow you to indicate initial page number and first page to begin printing, as well as to concatenate files without page break.

Figure 1: *Examples of typefaces and graphics available from the* Fancy Font *Hershey character database.*

Efont

You can put almost any foreign characters and mathematical symbols into the prepared fonts by using the Efont editing program. You transfer specifications for particular characters to separate word processing files and modify them with your word processor. The character is displayed on screen with asterisks representing the dots of the matrix, and you just add, move, or delete asterisks to form a new character. A print feature lets you test what you have made. Values that reflect a character's size are given in the upper left-hand corner of the screen, and, when you change a character's size using Efont, you must change the value to reflect the new size. For instance, if you add an umlaut (..), the size of that character will change. This detail is easy to overlook and can cause strange character placements. Every font has a fixed length, so to strobe your newly created character, you must insert it in place of another character that you are not using. Characters such as the at sign (@), the ampersand (&), and the carat (^) are good choices. Efont provides a command that allows you to do this. Presto! You have created your own special language or math font.

Inventing Special Fonts

The Cfont program lets you create an entirely new font using *Fancy Font*'s version of the 1,594-character Hershey (National Bureau of Standards) database (see Figure 1), which includes, among other things, the Greek and Cyrillic alphabets, graphic and musical notation symbols. You match up the index numbers of the Hershey characters with those of the ASCII code your keyboard recognizes, and Cfont will generate a complete font file for you. In order that your new font will match other fonts in size, a special command allows you to change the dimensions of the characters, I managed to work up a complete Greek font this way, but my new font forced wider spacing

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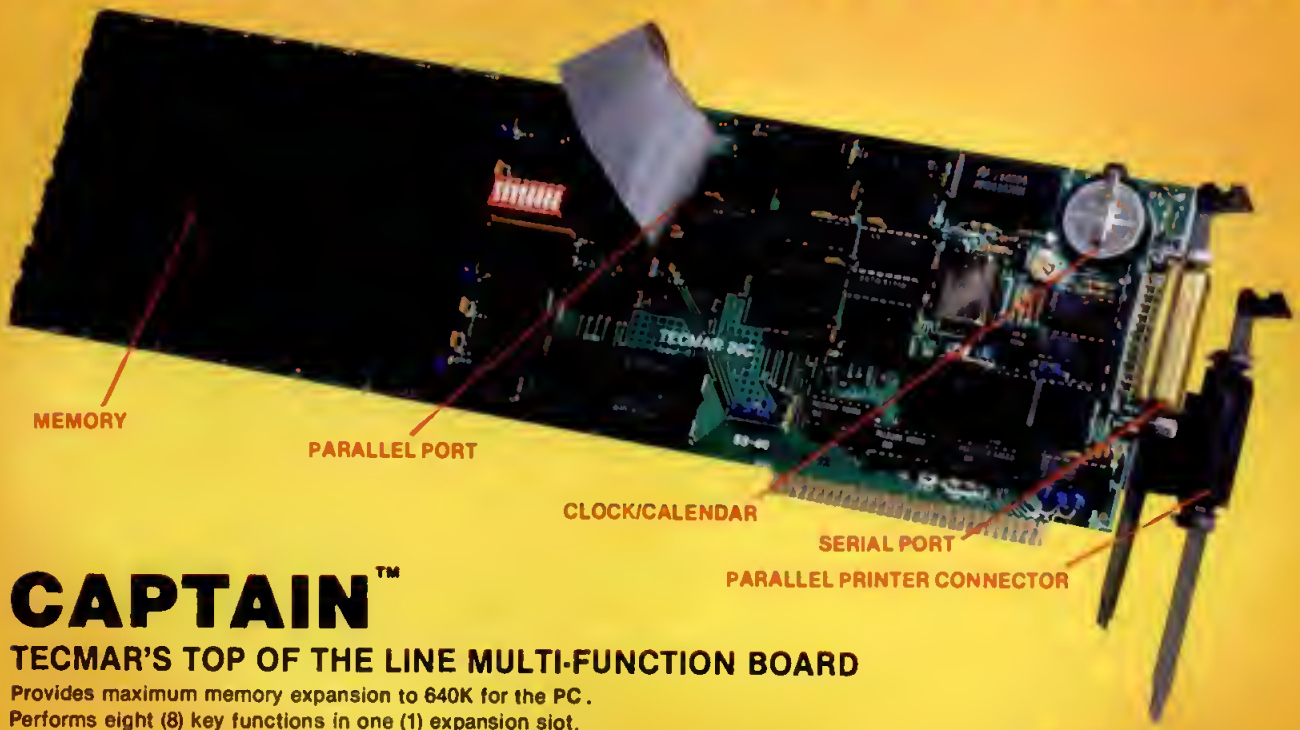

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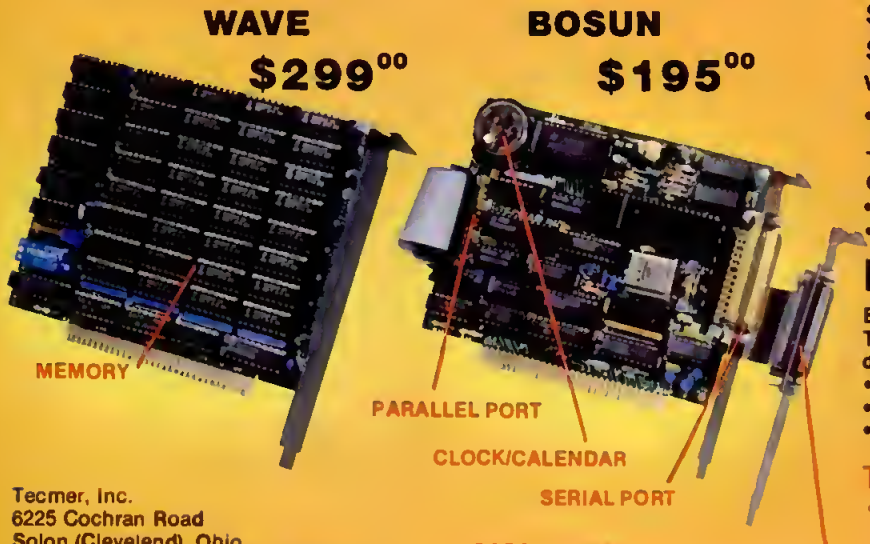

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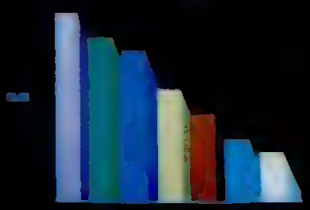

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between lines than I wanted there to be.

I called SoftCraft for help and spoke to Bill Overman, who, with Robert Fenchel, wrote *Fancy Font*. Overman explained that changing the size of Hershey characters in Cfont does not automatically change the top and bottom blank point values on your screen. These have to be changed by a command function in the Efont edit program. The current manual doesn't explain this problem but future versions will.

Future releases of *Fancy Font* are currently underway and will be made available to present owners for a nominal update fee. The first, which will be out shortly, is a special IBM PC version that bypasses the high information-checking overhead, which slows down the program when running under DOS.20. This version is also compatible with the Gemini printer. A second revision, which will be available later this year, will provide word wrap, backspacing, and overprinting capabilities, and will allow for variable settings of the left margin.

> The manual is set entirely in Fancy Font typefaces.

The manual is 100 typewriter sheet-sized pages in length and is set entirely in *Fancy Font* typefaces. It looks attractive and reads well, explaining the details of the program operation clearly. However, it would have been useful if the manual supplied detailed runthroughs of sample operations. *Fancy Font* is complicated and using it may be difficult if you don't read the instructions carefully or if you are a sloppy typist. Fortunately it is set up so that most operational commands have default values. The program recovers from your blunders, so the trial-and-error method is a fun way of exploring *Fancy Font*'s capabilities. In addition, help screens are available at all points where users could become easily confused.

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What's special about *Fancy Font*? For a nominal investment you can turn your clunky Epson into an advanced dot matrix printer. The Roman fonts are clear, the print quality is even and aesthetically pleasing. The italic fonts are a bit fuzzy and hard to read, but you can modify them if you wish. The Roman bold, sans serif, slanted sans serif, and Olde English faces reproduce nicely. The super- and subscript font characters are well-propor-

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tioned and clear. The script fonts are attractive, too, but I haven't found a use for them myself. You maintain complete control over all the Epson fonts. The formatting capabilities are superb. I edit a newsletter for a local botanical society and use *Fancy Font* to produce camera-ready copy that looks like it's been professionally typeset.

There are some significant problems, though. Since *Fancy Font* uses a graphics mode, it must give the printer 1 byte for every 120th of an inch, which translates into about 90,000 bytes per page. It may be nice to know you have one of the hardest working software programs on the market, but this also means that you can't use a spooler (unless you can spare 88K for print buffer per page). And, a spooler certainly would be useful here. Four characters a second (eight with an Epson FX) is about six times slower than letter-quality speed for advanced dot matrix printers. You get 8-, 10-, 11-, 12-, 18-, 20- and 40-point sizes in the Roman typeface. Since the fonts have proportional characters (for example, the letter *i* is much narrower than the letter *m*), the 12-point size doesn't quite fill a line on a sheet that is 8½ inches wide. The people who prepared the good-looking *Fancy Font* manual used a fancy word processor to put about 85 characters on each line, but most users will have word processors with only 80 columns. The problem isn't so serious that you can't live with it, and, fortunately, SoftCraft promises both fixed-width fonts and larger 14-point fonts in future versions of its product.

Since the characters in each font are usually different widths, it is impossible to accurately gauge the printed length of a line of characters on your monitor. As a result, justification is a guessing game, and you must expect to run a couple of rough drafts to crop those lines that are too long. The word wrap feature, available in future versions, should take up some of the slack. In any case, the problem doesn't occur that often: maybe one line for every two pages.

The print quality of *Fancy Font* is as good as that of the best advanced dot matrix printers. And for $180, instead of the $2,000 you would pay for an advanced dot matrix printer, it offers a lot of fancy fonts. ■

Richard H. Zander is curator of botany at the Buffalo Museum of Science. He uses the IBM PC for word processing, data management, and scientific research applications in his work.

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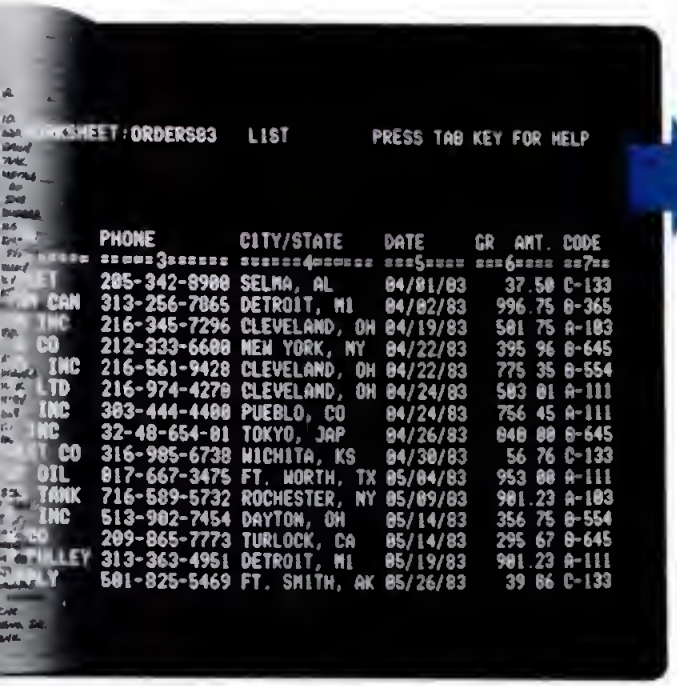

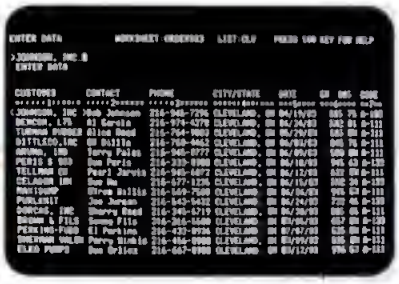

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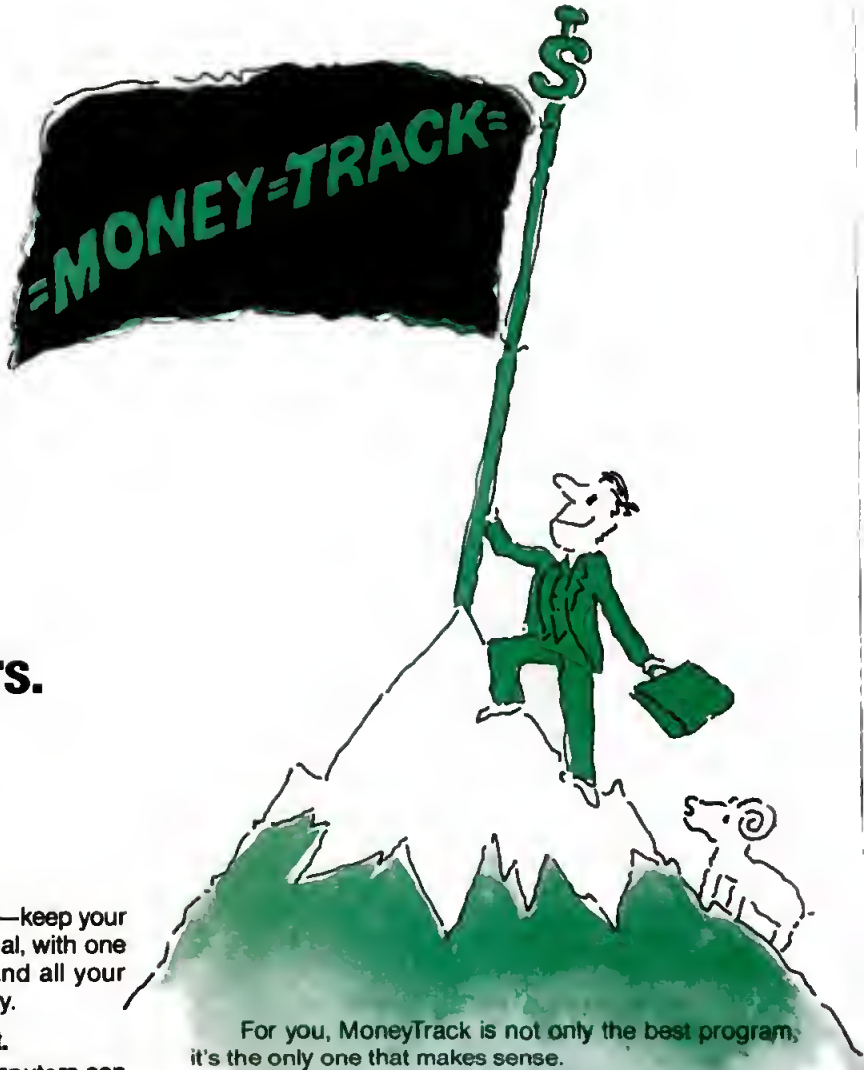

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Financial planning can be convenient and profitable for users of the IBM PC, thanks to two new systems that apply the capabilities of the microprocessor to the daily business of money management. Huttonline, from E.F. Hutton, and micro/CA$H-Register, from Irving Trust Company, are two computer-based money-handling services available to PC owners nationwide.

Medium-sized and larger businesses will be interested in the money handling and account reporting capabilities of the Irving Trust system. E.F. Hutton's service, Huttonline, allows clients to access the firm's computers for up-to-the-minute personal account and investment information.

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Irving Trust's micro/CA$H-Register is a money management system with a growing range of capabilities. It's the intelligent terminal version of the bank's dumb terminal system, simply called CA$H-Register, and it was developed specifically for use with the IBM PC.

Micro/CA$H-Register is a boon to multinationals and to any business, institution, or financial organization with overseas offices or business ties. It's accessible from anywhere in the world where there is a local time-sharing network with satellite or common carrier connections. Transmission is at 1200 baud. Users pay for micro/CA$H-Register on a per-instruction basis. There are no license charges or monthly maintenance fees.

The system's current capabilities include funds transfer, account reporting, and transmission functions. If the morning's opening balance report shows a $5-million payment logged in overnight, the money can be deposited immediately into an interest-bearing account, for example. And since all reporting is up-to-the-minute

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CIRCLE 296 ON READER SERVICE CARD

at any time, virtually any place in the world, whoever is at the office and authorized to enter the system can make a transfer 24 hours a day.

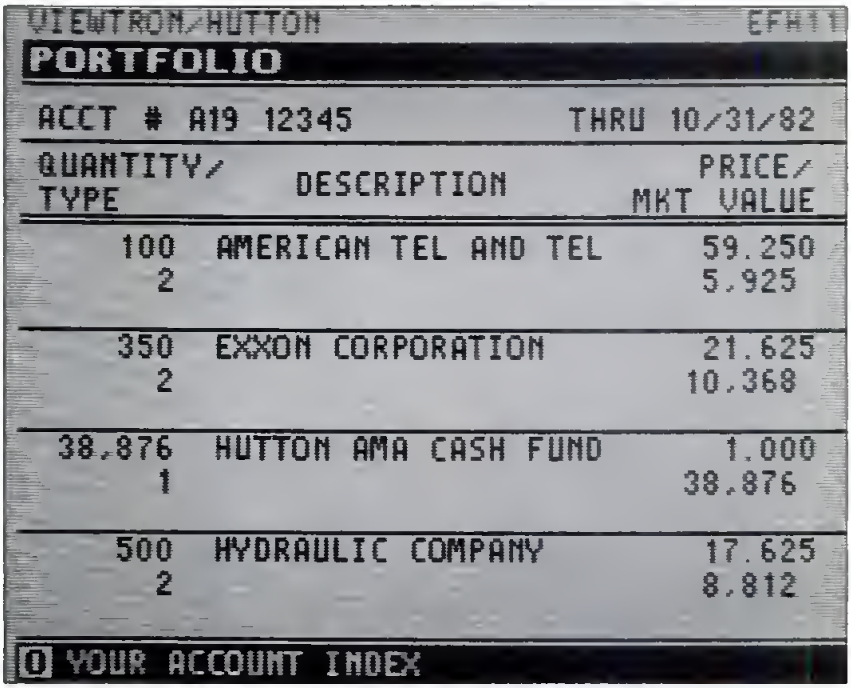
The main menu is accessed by inserting the master program diskette in drive A and the transaction file in drive B and entering your passwords. If you have a color monitor, micro/CA$H-Register offers a display with prompts, menu items, entries, and column/row headings in different colors. The monochrome display uses different shades and intensities. For example, prompts and error notices show up in pink in appropriate places on the color display; they're a lighter shade of green on the monochrome version.

The various micro/CA$H-Register screens offer good, clear prompts, including directions for the PC's function keys. Four of the keys are permanently assigned, while the rest change from menu to menu. F8, for example, is always "yes," and F9 is always "no." This assignment holds for all languages (foreign languages, not computer languages) spoken by users around the world who will be tying into the system.

The Main Attraction

The main menu is divided in half, with most of its intelligent functions on the left side and most of its "dumb terminal" functions on the right. The left side features a funds transfer package, which allows off-line preparation prior to transmission. You can also get balance reporting from start-of-day onward, including the previous day's account activity, as well as close-of-day reports on electronically processed debits and credits, including funds transfers, automated letters of credit, and foreign exchange and loan transactions.

Additional capabilities that will join the funds transfer package on the left, or intelligent mode, side of micro/CA$H-Register's main menu are slated for early to mid-1984. Foreign exchange/deposits, collections, securities, documentary credits, and treasury management already have



A screen from Viewtron, E.F. Hutton's electronic information service.

option selection numbers on the menu.

The right side of the menu is mainly for housekeeping, maintenance, and several dumb terminal functions. Administration, which includes setting security and passwords, is first on the list, followed by the dumb terminal system, CA$H-Register. Dumb mode capabilities include balancing checks, accessing anything in CA$H-Register, and accessing other banks' dumb systems. Data transmission, an intelligent function, is the third option on the right. The user can also store repetitive (regularly made) funds transfers through an option on the right side of the menu. Finally, there is start-of-day processing and return to system.

The most useful and convenient of the main menu options currently available is the funds transfer package. Selecting funds transfer from the main menu gives you seven new options. You can enter a nonrepetitive or repetitive transfer, verify a specific transfer, batch-verify several transfers, display a transfer, display a transfer report, or list items by status.

This last option lets you call up a list of all items you processed during the day so far, showing item number, amount, status, and reference number. Displaying a transfer report will provide all the data on a specific transfer, including addresses of receiving and account parties, amount, status, reference numbers, payment details, and bank information.

If you want a report at the end of the day, micro/CA$H-Register will get you ready for tomorrow by summarizing closing book balance, closing balance available, and available balance for the next business day for each account.

Once you've set up a transfer and have gone on line to send it, it's received, processed, and confirmed within seconds. Its completeness and off-line entry capabilities make the funds transfer package what Irving Trust senior vice president Samuel Newman says it is, "the first of its kind."

Need Help?

If you run into trouble in setting up or sending a transfer, you can talk 'til your

(continued)

heart's content to the console operator at Irving Trust's headquarters in New York, and at no extra charge. In many cases you can type your problems directly into the system and get back an immediate answer with the solution. If the operator happens to be away from the console (it's staffed 24 hours, but more lightly at night when at least some of New York City sleeps) or if you're using a language other than English, you may have to leave a message and wait for an answer. More staff will be added as the service expands.

A useful feature of micro/CA$H-Register is that it lets you enter and verify both repetitive and nonrepetitive transfers before transmission, and it provides immediate status reports on all items entered, verified, and sent. This off-line entry cuts transmission costs; whether the small amounts thus saved are of any great importance to a company making million-dollar transfers is debatable. Items not yet verified appear on the screen with a note to the effect that they're still awaiting action.

Clearly, with all this money changing hands, or, more accurately, changing machines, good security is essential. The Irving Trust system provides several levels of increasing security, with the customer deciding which company employees can perform which operations. The system then assigns identification numbers and passwords accordingly. If a company chooses, it can assign as many as three passwords to each of its employees. Customers can change ID numbers and passwords as often as they wish. If they don't change their numbers on their own within a given period of time, the system will refuse to admit them, in effect forcing them to change. Text authentication of customers' messages during transmission provides an additional level of security.

Information about micro/CA$H-Register is available by contacting Kenneth J. Soldwedel, vice president of the Irving Trust Cash Management Department, at (212) 487-6300.

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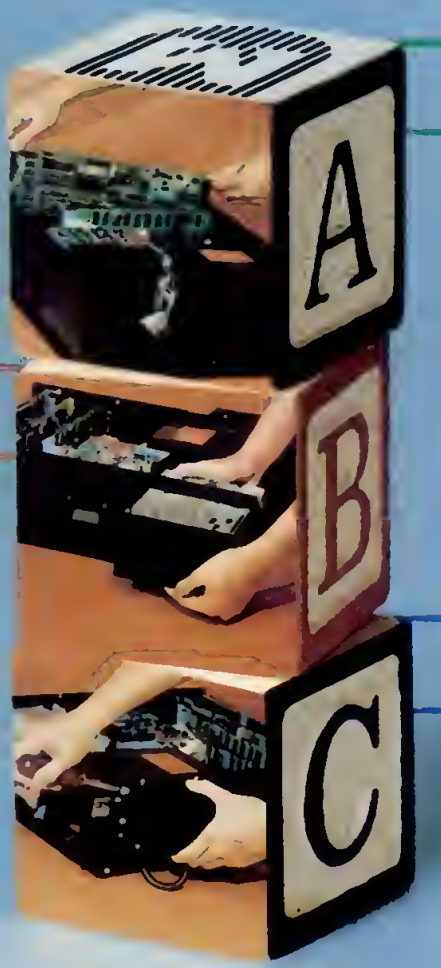

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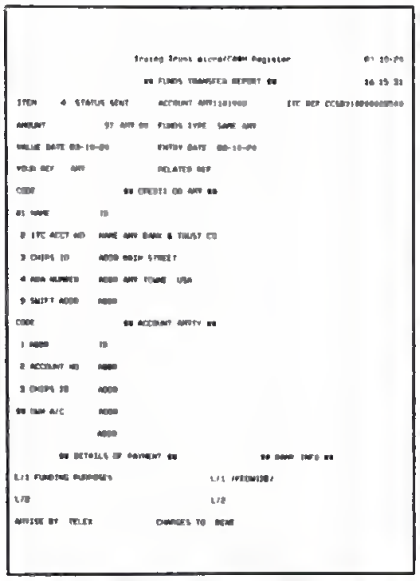
mation, and investment briefs. They can send messages to their account executives as well. From nearly anywhere in the United States, a local call will get you your portfolio positions, cash and margin balances, and open orders, as well as the status of Asset Management Account and Asset Reserve Account check-writing, and other transactions. It's up to date at all times, saving clients the wait for an end-of-month statement.

Huttonline's chief competition is TradePlus, an independent service now seeking affiliation with brokers (see "TradePlus: Your PC's Seat On The Stock Exchange," *PC*, Volume 2 Number 1). TradePlus does allow you to place immediate orders, but the cost for this service is much higher than the cost of Huttonline, especially if you want up-to-the-minute quotes.



A Funds Transfer printout from Irving Trust's micro/CA$H-Register.

Huttonline charges $25 for sign-up and $17 a month for unlimited use, in addition to any fees charged by the videotex operators who will be providing network access. In most of the country, this will be CompuServe. South Florida users will dial into Huttonline via the Viewtron system, operated by Viewdata Corporation of America, a Knight-Ridder subsidiary. Viewtron customers will pay $12 for the whole Viewtron service, while CompuServe customers will get Hutton only. Transmission is at either 300 or 1200 baud, depending on your equipment.

At present, Huttonline is primarily an information service, with lots of room for more capabilities—and more are planned for the future. The ability to place orders with it is limited at best.

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most of its customers want is an up-to-date information retrieval system that provides the latest data on their accounts. Customers still prefer to talk to their brokers before placing orders; in any case, Huttonline is not intended to replace personal contact with a broker.

All stock activity in all your accounts can currently be accessed through Huttonline. Commodities are not yet on the system, but they will be added. The service provides your portfolio value and the status of your investments as of the close of the last trading day, plus transactions over the last 30 days, cash and margin balances, open orders, and dividends and other incomes. The service is especially useful if you're writing checks on an Asset Management or Asset Reserve account. Both can fluctuate widely with market changes, so it is important to know your balance.

The other major Huttonline services are briefs and summaries of Hutton research and investment reports. If you want more information on a topic than the screen provides, you can order the full brochure via a message to Hutton and it will be delivered within a few days.

You Talk, Hutton Listens

Aside from some minor differences in the way the menus are set up, the only major difference between Huttonline on CompuServe and Huttonline on Viewtron is in communications. On both services, you send your messages to Hutton directly on Huttonline. However, since Viewtron has its own communications capability, Hutton will write to you at your Viewtron mailbox.

You can send messages to your broker and to Huttonline operators. Hutton does not encourage transactional messages and expects that most electronic chitchat between customer and account executive will be along the traditional information-seeking and advice lines. However, some limited buy/sell orders can be given. You can direct your account executive to "sell at market," for example, but you can't direct him to "sell at 50," because he may or he may not be there at the time the stock hits 50.

"It's not for time-sensitive orders," said Lee R. Greenhouse, assistant vice president for videotex and personal computing services. "The research we've done says that people want information.

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They want to talk to their brokers before deciding and ask them what they think." At some point most of the major brokerage houses are going to be providing electronic access, and decisions will have to be made about whether these services will allow direct placement of orders. For now, though, Huttonline's main advantages are the immediacy of its information and the ability to use it at your convenience. "We're getting away from the constraints of market hours and the broker's office hours," said Greenhouse.

Huttonline has a second communications channel that goes right to the people operating the service. It lets you tell Hutton how you feel about the various features of the service and what other capabilities you'd like to see it have. You can also make suggestions for improvement.

Hutton also sends you, through menu options, information on the service itself, with user tips, news on what's been added to the system, and summaries of commands and service descriptions. This service can be accessed through the CompuServe version's "Information Menu" or the "User News" option on the Viewtron main menu.

The Password Is . . .

You access Huttonline with a two-part password. One part is an identification number assigned by Hutton, and you choose the second code; it can be alpha, numeric, or both, and you can change it as often as you wish. If you have more than one account with Hutton, you can assign different passwords to each. You must call Hutton to change the password. The system will cut off erroneous password entries after a certain number of logon failures. As a further security precaution, Hutton monitors the system constantly and looks for unusual usage patterns.

Like the home banking systems now in various stages of development, Huttonline can be expanded in several directions. Users can already write checks, and a formal bill-paying system could easily be set up. Other services could put Hutton in competition with banks, which might well take their own services in the direction of brokerage.

A few years down the line, we may well be doing all our financial tasks, from budgeting to banking to investment, on one comprehensive, electronic, financial services system. ■

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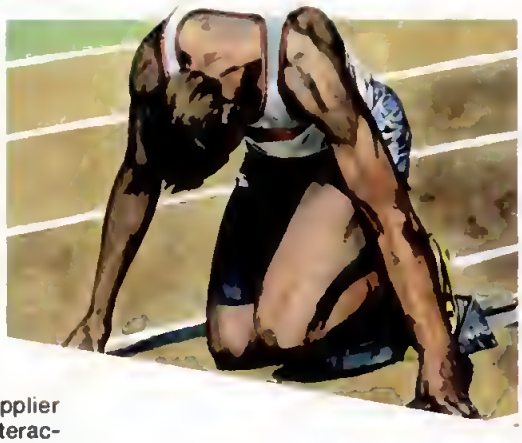

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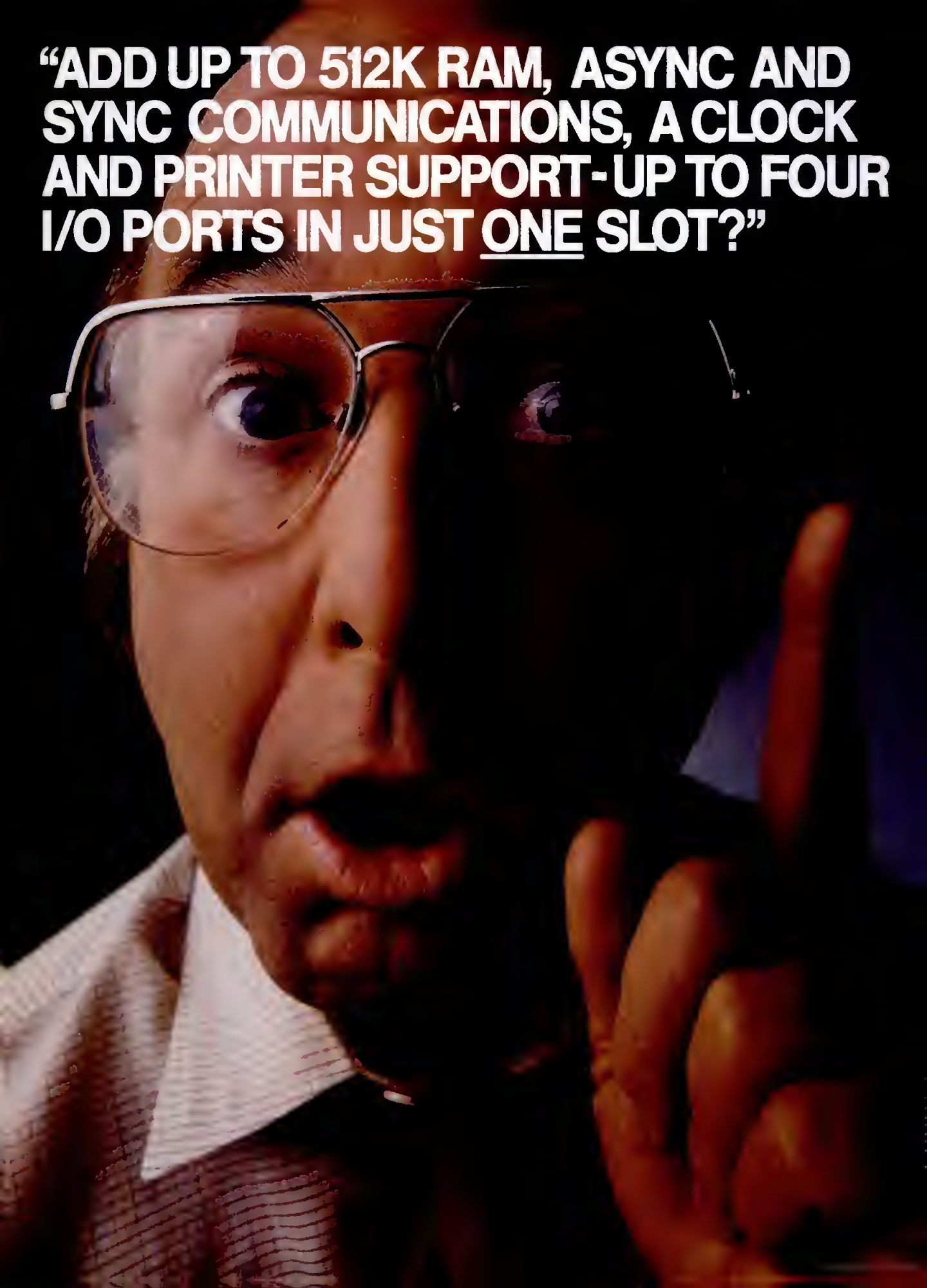
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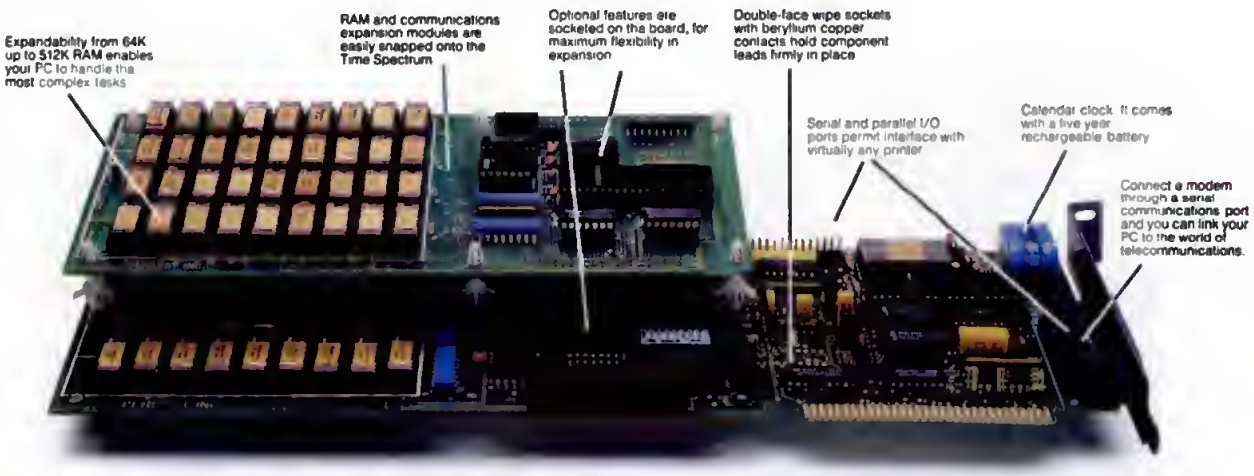

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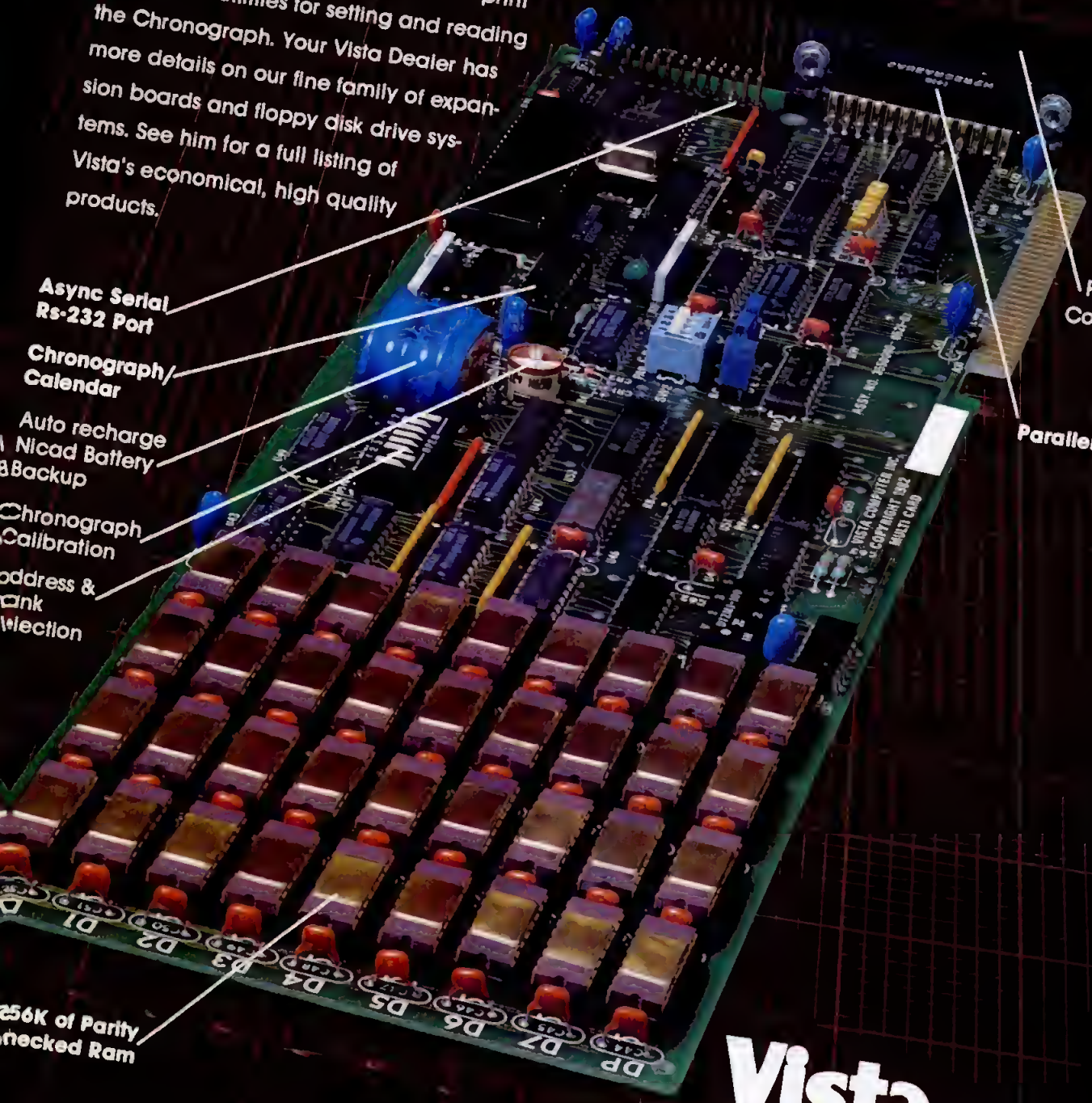

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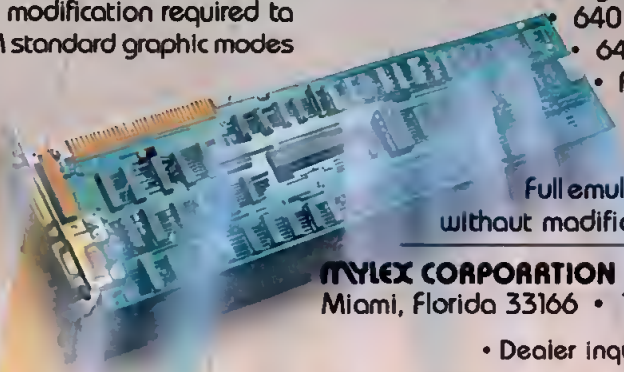

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Software With Manual Appeal

A technical writer tells how some simple tactics can help software producers upgrade the appearance of their documentation to make their products the buyers choice.

You're searching through the shelves of a personal computer store for just the right software package, possibly a word processor or a database manager. There are many products to choose from, so you don't want to make your decision lightly, especially with software prices that range up to $500. You finally narrow down your choice to two products that, according to the salesperson, have roughly equivalent features. How do you decide which one to buy?

The first thing you do is look at the manuals. When you pick up the manual for product A, you notice that it is similar in size to the IBM PC manuals—small and easy to carry. It has an attractive hardcover binder with stenciled lettering, and it is boxed like the PC manuals for easy shelf storage. You open the manual and discover typeset text, multicolored printing, and large, informative headings.

In contrast, the manual for product B does not come in a binder. It consists of 8½-by-11-inch pages stapled together at the side. When you open this manual, you discover that the text was produced on a dot-matrix printer and that the pages are faded photocopies of the originals.

Without looking any further—without reading the manuals and without trying the software on the store's machine—which product are you more likely to purchase?

This example illustrates a tangible benefit of good packaging. Given two similar products, a customer will purchase the one with the higher-quality appearance. And since diskettes look pretty much alike, customers often turn to manuals to evaluate the quality of a software program.

How can manual writers put quality—or at least the look and feel of quality—into the manuals they write? This article describes some of the methods I have discovered in my own line of work as a writer of technical manuals.

Good-looking Is User-friendly

The documentation that accompanies the IBM PC manual was widely praised upon its release, and today, people continue to find it well-written, easy-to-use, and accurate. Why?

If you examine the PC manuals closely (don't just read the *Guide to Operations*; look at Appendix C of the DOS manual

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too), and compare them to similar kinds of manuals, you'll find that there's not too much difference in the quality of the writing. The PC manuals contain their share of passive voice and confusing half-sentences. So why are people convinced that the PC manuals are great? There are three primary reasons.

First, viewed from the outside, the PC manuals are attractive and professional. They come in sturdy binders with matching boxes that promote convenient shelf storage. The binder and box colors are subdued earth tones, which blend easily into any setting.

The effect of the packaging is subtle, but certain. The manuals look expensive, authoritative, and friendly. The manuals look so nice that you almost want to cuddle up before a cozy fire and pour over them.

Second, upon opening the PC manuals, you discover that the text is typeset and that color distinguishes displays and example commands from the remainder of the text. These features provide the manual with a professional and authoritative look that reinforces the good impression you formed earlier. Though the use of color means little in terms of the manual's content, it provides a "finish" that can be meaningful to a potential buyer. The main purpose of color as it is used in the PC manuals is to make the information easier to follow. A reader may conclude from this that the writers of the manual have done other things—such as providing clear, accurate instructions—to make the documentation easy to use.

Third, when you read the IBM manuals, you notice that each page contains small, digestible pieces of information broken into small sections or numbered steps. The typeface is large, and there is liberal use of white space.

Limiting the amount of information on a page reduces the confrontation factor a reader experiences when turning to the page. A page containing paragraph after paragraph of closely typed text is intimidating. But a page containing a lot of white space looks easy to read, especially if there are useful section headings to break up the information into small, understandable topics.

The writers of the PC manuals understood that it's easier to comprehend several small, simple things than one large, complicated one. Therefore, they divided procedures into small, simple steps. Each step is easy to comprehend.

Learning from IBM

If you are in the business of producing manuals, what can you learn from the PC manuals? If you have significant financial resources, you can invest in handsome packaging as IBM did. Several companies, such as IUS with *EasyWriter II* and Lotus with *1-2-3*, used boxed manuals with packaging that is almost identical to IBM's.

But binders and boxes are expensive—more than $5 a manual. Typesetting can cost several thousands of dollars, and color adds to the already expensive costs of printing. Often, small companies barely have enough money to produce their products; expensive production costs for manuals are beyond their means.

But there are ways to keep the costs down and still produce manuals that put readers in a good frame of mind before reading.

First, you can use pages that are the same size as those in the PC manuals (5½-by-8½-inch) or a similar size (VisiCorp uses 6-by-9-inch pages in its *VisiCalc* manual). Small-sized pages cost less to print than 8½-by-11-inch pages (although you may have to print more of them), and they give the reader a much better impression of your product. If you print your manual on standard 8½-by-11-inch paper, you give the reader the impression that you ported the product from another system and modified it to run on the PC. This means, according to some, that your product is inferior to those developed especially for the PC.

If you compromise on page size, users might wonder what else in your product

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dBASE WINDOW is $249, dBASE DOOR is $149, either manual only $20 (manual price will be credited toward future purchase of program).

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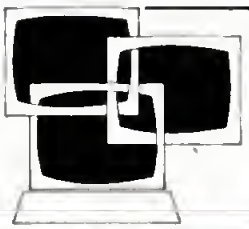

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MANUAL APPEAL

you compromised. Also, use the best-looking binding you can afford. If possible, supply loose-leaf pages with a three-ring, hard-cover binder. If that's too expensive, try to find a less-expensive three-ring binder. A manual with loose-leaf pages is easier to update with change notices (a subtle hint to your users that you intend to support them with updates).

If supplying a three-ring binder is too expensive, consider perfect binding, which is less expensive than supplying a separate binder, but still attractive. With perfect binding, pages are glued to a spine. Paperback books are perfect-bound, as well as some large magazines (*PC*, for instance). Although a perfect-bound manual is hard to update, it gives the favorable impression that your manual is a finished product and not subject to revision.

Another alternative is saddle-stitching. Saddle-stitching uses double-sized pages that are folded in half. Staples at the line of the fold keep the whole thing together. Magazines such as *Time* and *Newsweek* use saddle-stitching. Saddle-stitching is usually cheaper than perfect binding, and it looks almost as nice. However, there is a limit to the number of pages a saddle-stitch manual can contain (usually 50 or 60 pages, depending on the thickness of the paper). But saddle-stitched manuals also are hard to update.

You should consider stapling your pages together at the side (side-stitching) only as a last resort.

Cover and Type Style

Regardless of the kind of binding you choose, select a cover that is attractive and appropriate for your product. Unless your product is a game or a children's product, use subdued colors. Avoid using just black and white.

Avoid using drawings of people or familiar objects in your cover unless the drawings are very stylized. Drawings of familiar objects are seldom perfect representations. Readers often notice this and frequently form a negative impression of the product.

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MANUAL APPEAL

Your company logo is important, too. A familiar-looking logo placed in a familiar spot on your manual can build confidence in your product.

If you can afford to typeset your manual, do it! Typesetting is probably the best thing you can do to build a reader's confidence in your manual.

Typesetting costs vary depending on the area of the country in which you live, the number of complicated tables and figures in your manual, and the number of pages in the manual. A 100-page manual could cost two to three thousand dollars.

To keep your typesetting costs down, look for vendors that accept word processing diskettes as input to the typesetting equipment. This saves you the cost of rekeying your manual, and it also saves you the trouble of proofreading the entire book after the typesetter returns it to you. Many typesetting vendors now have the ability to read PC-formatted diskettes and interpret *WordStar* files.

If you look at your production costs as a whole, typesetting is not as expensive as it seems. Typesetting gives you true proportional spacing, and the clarity of typeset characters allows you a smaller typeface than dot matrix or letter-quality printers provide. Therefore, you can get more information on a typeset page without making the page look crowded.

When you consider that a print shop charges you by the page (let's suppose 2 cents per page for this example), you can see that a 100-page manual that is reduced to 70 pages by typesetting costs $1.40 to print (versus $2.00 for the nontypeset version). If the typesetting costs $2,000, you can defray all the cost by printing 3,334 manuals. If this seems like more manuals than you will ever print, consider that by printing 1,500 manuals, you defray almost half the cost.

A Word about White Space

Whether or not you typeset your manual, you can still make it more attractive to your readers by effective use of white space.

There are many tricks you can employ to increase the white space, but three that are easy to incorporate into manuals are bullets, numbered steps, and breakouts.

Bulleted information is set off from the remainder of the text with spaces, indentation, and heavy black dots (usually lower-case *o*'s filled in with black ink).

Use bullets to list a series of items for which order is not important. For example, you can use bullets when listing the important features of your product, the required hardware, or the topics of an upcoming section.

Numbered steps, like bullets, are used when making lists of things. However, you should use numbered steps when the order of the elements in your list *is* important. Numbered steps are used most often for hardware assembly instructions, software installation procedures, and sample user sessions. In these kinds of documentation, the numbers break up complicated instructions into a number of short, simple tasks. This format provides an easy step-by-step guide that reassures readers they haven't missed steps or glossed over something important.

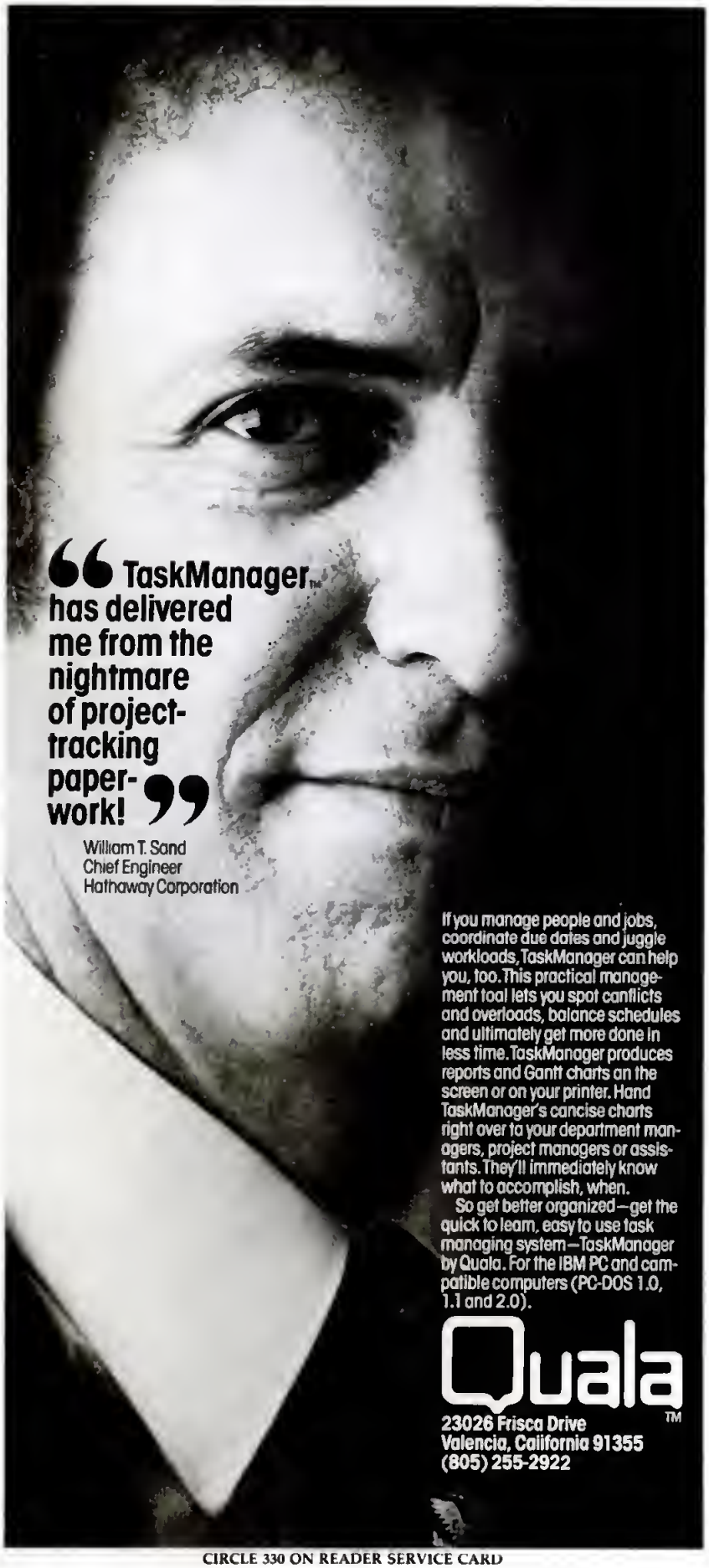
Numbered steps are especially helpful if the reader is entering the commands at the keyboard while reading the instructions. The use of space separating the steps allows him to slide a piece of paper down the page as he reads, thereby keeping his place as he types out the instruction on the keyboard.

Breakouts are words that are "broken out" from the rest of the text; that is, they appear on the left side of the page, while the main body of text is shifted to the right. Like bullets and numbered steps, breakouts are used for lists. However, breakouts work best when you want to list a series of key words and their definitions, say, for instance, in a glossary or when defining parameters within a command.

The following is an example of how breakouts can be used to describe command parameters.

The format of this command is:

PERMIT filelist access [USER=user]



CIRCLE 330 ON READER SERVICE CARD

MANUAL APPEAL

[DATA] [DIRECTORY] where:

filelist	A list of files.
access	An access character which grants the corresponding access to the file list.
USER=user	An optional parameter which specifies a user (other than the operator) for whom the access rights apply.
DATA	An optional parameter which allows you to specify that only DATA files are affected.
DIRECTORY	An optional parameter which allows you to specify that only directory files are affected.

In the example, it is easy to tell where the description of one parameter ends and the description of the next begins. This is helpful both to novice users and to experienced ones who already know how the command works in general, but who need specific information about one, or selected, parameters. Instead of searching through an entire paragraph of information to find the description of a particular parameter, the reader can simply scan the breakouts on the left side of the page to spot the ones of interest.

Conclusion

By examining different kinds of packaging and choosing the best you can afford, you will improve your product's appeal. And by using bullets, numbered steps, and breakouts to increase white space and make information easier to find, you demonstrate that you are committed to providing helpful, easy-to-follow instruction. These tactics can have a great impact on sales, especially in a software market where a customer's decision to buy may hinge on the quality of the manual. ■

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Bye-Bye Qwerty

The obfuscating, finger-tangling Qwerty keyboard may be losing ground to the user-friendly Dvorak.

Illustration: Seymour Chwast

Every job has its hazards. A baseball player might pull a hamstring rounding third base. A carpenter, while aiming for a nail, might hammer his finger instead. And anyone who works with a keyboard is almost sure to develop aching wrists, arms, and shoulders.

Though the computer is certainly a modern contrivance and in most respects reflects the latest developments from today's technological geniuses, its keyboard letter arrangement is an anachronism that has successfully resisted change for 110 years. This archaic keyboard layout, nicknamed Qwerty for the first six letters on the second row, has succeeded in tangling fingers, shortening tempers, and generally fatiguing and frustrating keyboard users since it was invented.

Thanks to a fellow named August Dvorak, however, there is a simplified keyboard that streamlines typing and it is available for the IBM PC as either hardware or software.

The Dvorak keyboard is not new—it was designed in 1932. August Dvorak was a professor of education at the University of Washington and an admirer of Frank and Lillian Gilbreth, the couple famed for their early studies of ergonomics. As part of time and motion experiments in which they utilized a motion picture camera to spot inefficient movement in a variety of tasks, the Gilbreths made films of typists in action. These films clearly showed the inefficiency of the Qwerty keyboard. To

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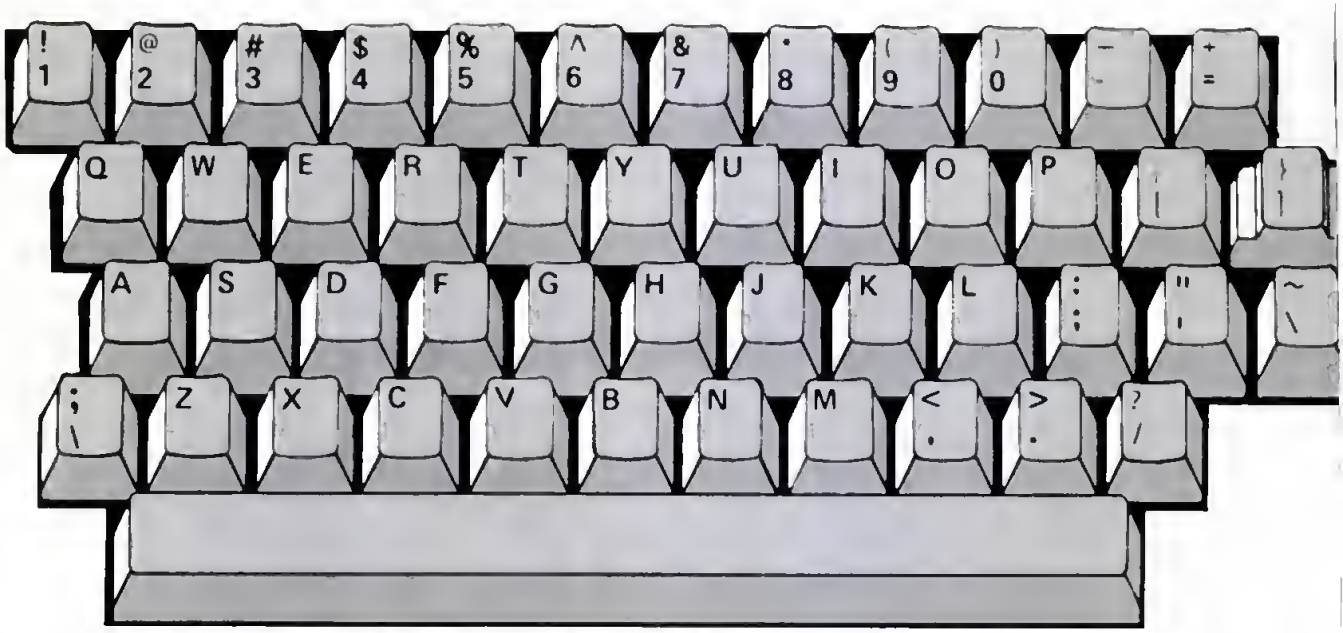

The ubiquitous Qwerty keyboard, a standard since the mid-19th century.

reach the proper keys, fingers had to perform acrobatics.

Bothered by this wasted motion, Dvorak decided to develop a better keyboard. Backed with grants totalling $140,000 from the Carnegie Foundation, he began his project.

He scrutinized the Gilbreths' typing films and classified the easiest and hardest finger reaches. He then painstakingly examined thousands of words to discover the frequency of individual letters and letter combinations.

Dvorak's studies convinced him of the uselessness of Qwerty. "It is possible to make, at random, dozens of typewriter keyboards that are as good or better than [Qwerty]," he commented. Dvorak tore Qwerty apart and designed a new keyboard layout, for which he obtained a patent in 1932.

A Better Idea

There are nearly 4,000 words that can be typed within Dvorak's home row, according to tests run by Larry Denenberg, a graduate student in the Computer Sciences Department at Harvard University. His tests also show that only about 100 words are possible using that row in the Qwerty system. Even the number of letters within this row favors Dvorak—it contains ten compared to Qwerty's nine.

After determining the home row, Dvorak placed the next most frequently used letters up a row. His studies of typists' finger movements revealed that it was easier to reach up than down. The least common letters, *q, j, k, x, b, m, w, v, z,* were positioned on the bottom row.

With this layout, the keyboard vastly reduces what are known as typing "hurdles." A hurdle is a pair of adjacent letters that are typed by the same finger, one keystroke in the top row and one in the bottom row, obviously a clumsy and fatiguing maneuver. Hurdles are particularly undesirable when they are consecutive. The word *piece* is an example. There are nearly 1,200 words with multiple hurdles in Qwerty, according to Denenberg. Utilizing Dvorak, there are none.

There are three major advantages to the Dvorak keyboard—reduced fatigue, reduced errors, and greater productivity.

The key to the simplicity and effectiveness of Dvorak is its home row. It contains all the vowels and the most frequently used consonants: *d, h, t, n, s*. These ten letters, located directly under or to the side of the index fingers in home position, allow 70 percent of all keyboarding to be performed without lifting fingers up or down a row. By contrast, Qwerty, with just one vowel and the infrequently used consonants *j, k, l* in this row, permits just 32 percent home-row keyboarding, forcing repeated row shifts.

The Dvorak system also cuts down the

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The Dvorak ergonomically designed keyboard layout.

number of words that must be typed with one hand. Based on Denenberg's tests, only 104 such words exist on Dvorak, but over 2,000 on Qwerty. The newer keyboard enhances rhythmic, balanced typing from one hand to the other, which considerably lessens fatigue. Dvorak further increases productivity for the predominantly right-handed public. Due to letter sequencing, 56 percent of the work is done by the right hand and 44 percent with the left. Denenberg was able to show that Qwerty reverses this ratio—57 percent is performed with the weaker left hand and 43 percent with the right.

Far less finger reaching, less awkward movements, better rhythm and more appropriate hand distribution naturally result in reduced errors. Thurman Clark, of Oregon's Public Employees Retirement System, estimates that using Dvorak has cut his workers' errors in half.

Productivity is, of course, the bottom line. The increase in production, using Dvorak, has been estimated at 10 to 40 percent. The savings realized by the Public Employees Retirement System falls in the upper portion of that range. "We have saved money," cites Clark, "and have benefited in other tangible ways. Because our people aren't as fatigued at the end of the day, they are happier with their jobs. This results in fewer sick days taken and minimal employee turnover. Training new employees is relatively rare."

Certainly another advantage of Dvorak, though it's played down by advocates, is an increase in typing speed. It is a benefit that is not particularly stressed, says Virginia Russell of the Dvorak International Federation in Brandon, Vermont. "But ergonomics, the harmonizing of workers with machines, certainly is," she says. "It's an issue that's become increasingly important for workers, and Dvorak fits right in. Increased comfort and greater productivity are the factors we emphasize about Dvorak."

August Dvorak developed his simplified keyboard while a professor of education at the University of Washington in 1932.

A Dvorak Convert

Those who have been exposed to Dvorak are enthusiastic converts. "I am a little bit of a crusader on the subject," admits Tom Root, a computer programmer for Apple Computer and a Dvorak disciple. "I've been using Dvorak for a couple of years and would never go back to Qwerty. Why use Qwerty, a keyboard designed to be difficult, instead of Dvorak, a keyboard designed to be simple?" He admits, though, that he was skeptical when a friend first convinced him to try Dvorak. Bad memories of learning Qwerty haunted him. "It took me 3 to 4 months of study, 2 hours a day, to learn Qwerty. I didn't want

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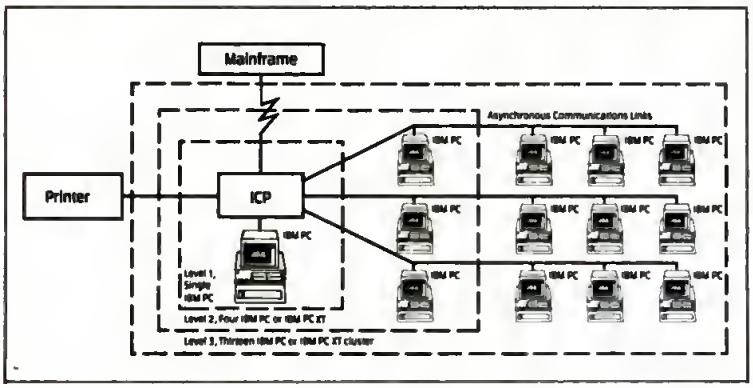

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CIRCLE 103 ON READER SERVICE CARD

to go through anything similar to learn another system, no matter what the claims of its ultimate benefits," he says.

With a Dvorak layout before him, he performed typing exercises for an hour. After that, he went about his work in his normal manner. "Within a week or so, my speed was up to its Qwerty level, an admittedly not spectacular 35 words per minute," he remembers. "The most immediate benefit was lessened fatigue." Root uses a software program that converts his computer keyboard to Dvorak. "During that first week I just kept in mind the home row, the vowels, and the essential consonants. My fears of learning a new system quickly evaporated. The intelligent layout of the keys and the large amount of work that can be done just within the home row make it easy."

Because Qwerty is such an established keyboard, however bad, it has gotten in the way of wide-scale Dvorak acceptance, Root claims. "We often get negative reactions to new ideas. People habituated to doing things one way are reluctant to try something different."

Root feels computers will spur Dvorak acceptance, something that probably wouldn't happen if only typewriters were involved. "There has always been a stigma attached to typing on a typewriter, but not to working with a computer. In fact, having and working with a computer is considered a status symbol.

"Many professional managers today never learned to type. But they are being required to operate a computer. They have to type, of course, to enter data. Anyone who cannot operate a computer keyboard is at a real disadvantage and is considered almost illiterate. Corporate power, in many ways, depends on the ability to write and that writing is increasingly being done on a computer.

"The Dvorak keyboard, since it is so easy to learn and use, should be a real benefit to these people. Through it, they will have a competitive business edge they might not have had if forced to rely on Qwerty."

Qwerty's Ignoble Birth

Intentionally misdesigned to slow down typists, Qwerty was born to frustrate all keyboard users.

The name "Qwerty" sounds faintly contemptible, as well it might. It was hatched over 100 years ago in an environment of shady dealings and dirty pool. The participants were a bunch of pretty fair tinkerers—the inventors who came up with the first commercially practical typewriter. Led by one C. Latham Sholes, this Milwaukee contingent put together a working typewriter model in 1868. Within 5 years, manufacturing was turned over to E. Remington & Sons, gun makers, of Ilion, New York.

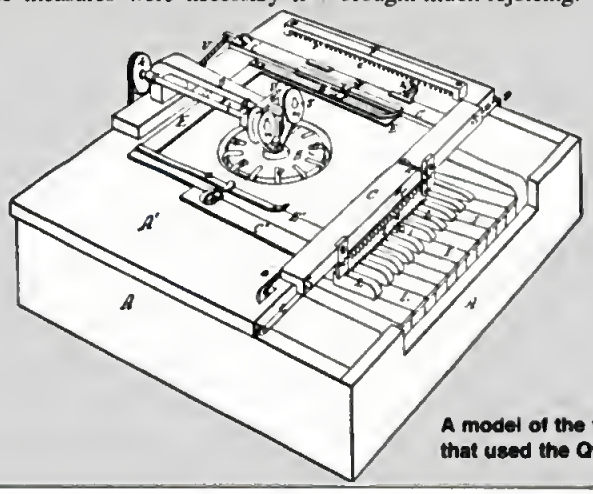
Much to the horror of Sholes and his band, though, their original typewriters were no match for even the earliest typists. Every time the typists began clacking away, the typewriters jammed.

Troubled, the inventors scurried back to their drawing boards. Their typewriter was in trouble, and they knew it. After much head scratching, pondering, and diagramming, they concluded the problem wasn't with their typewriter at all, but rather the typists. They were going much too fast. They had to find a way to slow them down.

Drastic measures were necessary if their machine was going to be anything more than a passing curiosity. And drastic measures, they determined, necessitated devious means. Someone (name unknown—such distinctions are better left unclaimed) suggested "fixing" the keyboard layout in order to get the typists to slow down. A member of the Milwaukee team consulted his son-in-law, a chap who was a Pennsylvania school superintendent. Unsuspecting, he didn't blink an eye when asked to supply "Dad" with the most frequently used letters in the English language.

Armed with this information, a new keyboard was designed that placed these letters in separate quadrants. By chance, this arrangement spelled out Qwerty on the top row of letters. Because frequently used letters were now all over the keyboard, a typist was forced to do a lot of reaching to locate desired characters. This reaching reduced speed and eliminated jammed typewriters.

Qwerty devilishly tangled a typist's fingers, bringing fatigue and frustration in its wake. But for a small group of Milwaukee inventors, the keyboard brought much rejoicing. —G.K.



A model of the first typewriter that used the Qwerty layout.

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CIRCLE 197 ON READER SERVICE CARD

Key Tronic's Dvorak for the PC

In response to customer demand to maintain its position as industry leader, Key Tronic of Spokane, Washington, is marketing an IBM PC Dvorak keyboard. "Our company's whole purpose is to produce highly efficient keyboards," says marketing manager Mark Tiddens. "Dvorak certainly fits that mold."

Though Tiddens is convinced of Dvorak's superiority, he feels that people are going to put up quite a fight to keep their Qwerty keyboards. "It's going to be difficult to break the habits of all those people used to one system," he says. Keeping this fundamental resistance to change in mind, the IBM PC Dvorak is being projected, at least initially, as a limited seller for Key Tronic. In essence, the company is offering it as a service item, much like its keyboards for the handicapped and for foreign languages. "It's entirely possible," Tiddens continues, "that in time, a healthy demand could develop for Dvorak." For the present though, the keyboard will not be shipped to distributors. It will be available only through Key Tronic headquarters.

A possible boost to the company's new product was IBM's announcement last July that it would sell its PC without the keyboard. That could spur sales of compatible replacements, which include Key Tronic's Dvorak. But it's too early to determine Dvorak sales, Tiddens states.

"To really make Dvorak happen," explains Tiddens, "it's going to take somebody like IBM using all its muscle. The sponsor has to bring it into the schools and introduce it to students just learning how to type. That's where keyboard allegiance begins and where Dvorak must be established." At present, however, IBM is sitting on the sidelines waiting to see if Dvorak interest translates into new Dvorak sales. "For the last three decades, we have offered a Dvorak keyboard on our typewriters and rarely sold one," explains a company spokesperson. "The selection of a keyboard is entirely a user's choice, and our customers just haven't wanted Dvorak." Until customers start demanding Dvorak, IBM will be content to continue providing machines with Qwerty keyboards.

Dvorak Software

Another way to achieve the Dvorak keyboard for the IBM PC is through software. Banking on public acceptance of Dvorak is Seasoned Systems, Inc. of Chapel Hill, North Carolina. In August, the company released *SureStroke*.

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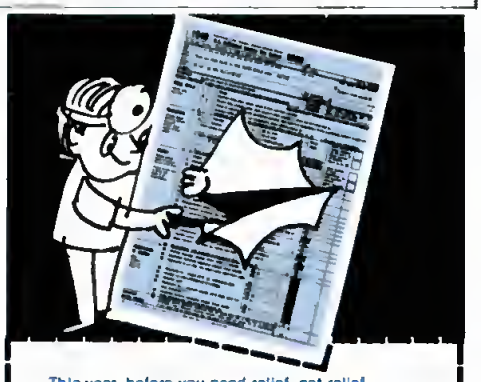

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The *SureStroke* translator intercepts and translates key strokes. It remains resident in memory along with DOS. If the letter *s* on Qwerty is pressed, for instance, *SureStroke* translates it to Dvorak and delivers the letter *o*. You can exclude from translation keystrokes preceded by the Ctrl or Alt keys. This option is valuable with a program such as *WordStar* that demands the Ctrl key to define commands.

Since most people are not fluent with Dvorak, Seasoned Systems provides a training program called *Coach*. "For someone who has never typed," says Seasoned Systems' spokeswoman Jane Helwig, "15 to 18 hours with *Coach* will net a 40-words-per-minute typing speed."

The package also includes a *SureStroke Learning Tape*. It's a cassette that is designed to put the Dvorak beginner in the proper frame of mind. "It is really a form of self-hypnosis, but we try not to use that term," Helwig relates. "We know it scares people."

Helwig is convinced that the *SureStroke* training program is essential to the product's success. "We thought of coming out with just the software but decided against it because it wouldn't be any good for people who don't know Dvorak. It's still a brand new system for most people, and they need guidance."

SureStroke comes complete with transfer letters to convert Qwerty keys into Dvorak. Directions also are given for popping off the IBM PC keycaps and rearranging them.

"Spoking" Interest

Interest in the Dvorak keyboard as a viable business tool is increasing. "Getting it into businesses used to be a pipe dream," admits Dvorak Federation's Virginia Russell, "but not any longer."

Dvorak is reaching beyond the smattering of individual users such as Tom Root and small organizations such as Oregon's Public Employees Retirement System. Large companies are taking a serious look at Dvorak. Within the last few months, Russell has huddled with American Airlines, Exxon, Equitable Life Assurance, and Fireman's Fund. "Lots of companies are on the brink of switching to Dvorak," Russell says, "In 4 to 6 months, there should be implementation.

"At present, I feel as if I am sitting in the center of a bicycle wheel with interest in the keyboard spoking out all over."■

Gary Kaplan is a San Francisco-based free-lance writer specializing in microcomputer topics.

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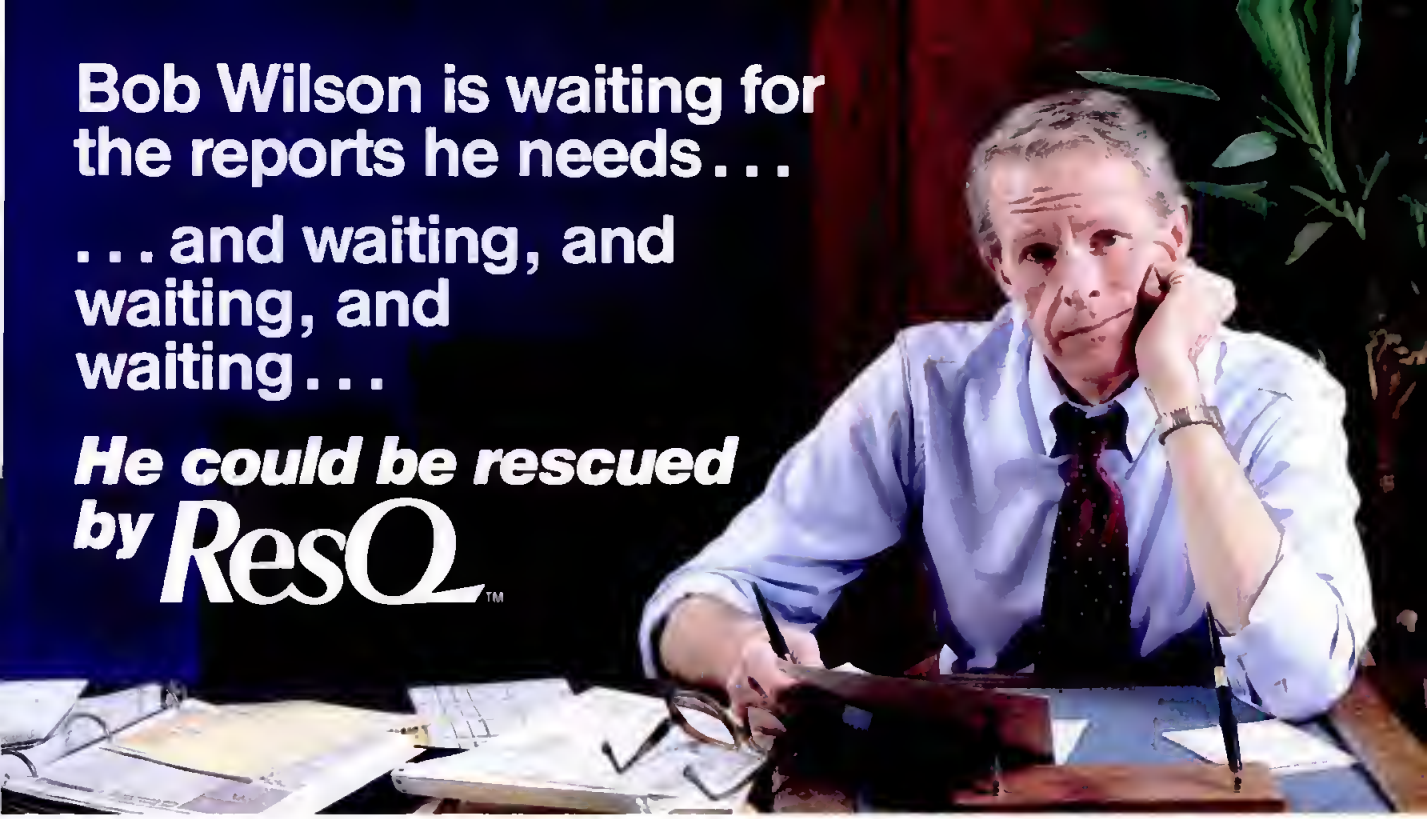

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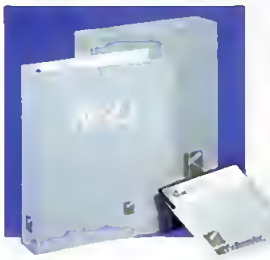

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The Hidden Talents Of MailMerge

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An old regular in MicroPro's star-studded lineup, *MailMerge* has long been known as a crackerjack mailing list handler. But *MailMerge* also provides print enhancement features to *WordStar* that no serious user should do without.

MailMerge is an optional file that is available with *WordStar* and *SpellStar* in MicroPro's "Professional" package. It can also be purchased as a separate program. It is not a database manager; you cannot sort with it; it will not help you maintain your mailing lists. *MailMerge* allows you to generate mailing list labels and create almost any form letter you can imagine with great ease and flexibility. You provide the basic list. You can use a database manager, or use *WordStar* in the nondocument mode. You'll need some program, such as MicroPro's *DataStar*, to sort and update your list (see "An End To Mailing List Madness" in this issue for more ideas). *MailMerge* takes your mailing list and merges each name or record into any document or format you create.

But a little-known fact is that *MailMerge* is essential to all serious document production. It performs many important functions, such as printing multiple copies of a document (you can't do it with *WordStar* alone), chain printing files (such as chapters of a book), and inserting variables into a document (such as today's date). The power of *MailMerge* gives *WordStar* added features that make it one of the most complete word processing packages available.

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Mailing Lists and Form Letters

In its best-known role, as a mailing list and form letter generator, *MailMerge* actually lets *WordStar* become a form letter generator, which alone it is not. *MailMerge* allows you to take a list of names or data and merge it with a form or letter that

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you've created in *WordStar*. *MailMerge* relies almost exclusively on dot commands to instruct it. A dot command begins with a period in column one, followed by a two-character code. When you use dot commands that are exclusive to *MailMerge*, the flag "M" appears in the rightmost column of your *WordStar* screen. You can tell *MailMerge*, through dot commands, what data file to go to (.df filename) and how to read the variables (.rv) of each record. The command .rv tells *MailMerge* what to call each variable or field in your data records. Then you simply plant the names you've given each variable into your document, preceding and ending them with ampersands (&name&).

You can create labels or letters in any format as long as the read variable names (on the .rv line) are the same as the labels you put in your document (see Figure 1). Print the document using the M option from *WordStar*'s main menu, and *MailMerge* will place the variable data into each place you've indicated.

Not only will it fill in the data you've supplied, but *MailMerge* will then reform your paragraphs (like *WordStar*'s ^B command) to compensate for variable lengths of the data from one form to the next. *MailMerge* can use any kind of data file in which the data is separated by commas, as long as there are the same number of fields in each record. This feature of *MailMerge* allows you to produce large, highly personalized volume mailings.

MailMerge's ability to insert variable data makes it a valuable tool. Not only can it insert long lists of variables from a mailing list, personal touches included, but it can also insert single variables. And the really nice touch is that it can ask you to supply the variables (.av). Once you've typed in your answer, *MailMerge* inserts it into your text where indicated.

The implications are far-reaching, and the possible applications are many. One of the handiest uses I've found for this feature is to insert the current date in my page header or footer. I've always had difficulty remembering to do this on my own.

Aid For The Absent-Minded

When I'm creating the first draft of a document, as in Figure 2, I enter the line

```
.av ''Please don't forget to
enter the date ! '' ,date.
```

My footer line tells *MailMerge* where to insert the date. As with multiple variables, the ampersands mark the spot (&date&). This is extremely useful for successive drafts of the same document, as I can always be sure that I am working on the most current one.

When it's time to print the file, I always use the M option. *WordStar* then asks "Name of file to MailMerge?". After I type in the filename and hit the Esc key, *MailMerge* will ask for the date before printing out the file. Once I've entered the date and pressed return, my document is printed out with the date neatly inserted in each footer. If I don't want to take the time to answer, I can just press return. *MailMerge* will insert a blank space where I called for the date to be printed.

You can use this technique for a variety of purposes. One use I make of it is to insert the name of the *WordStar* file. Especially on in-house documents, this can save tedious searches through your disks

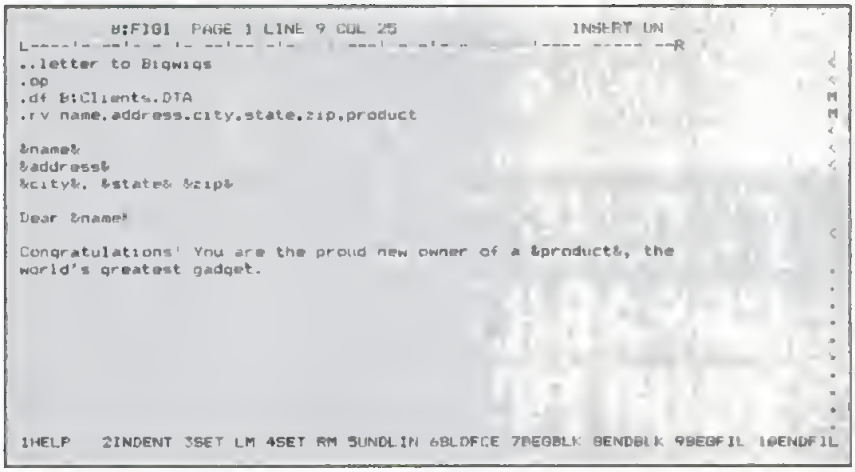

Figure 1: *Setting up a form letter in* WordStar, *with dot commands and ampersands to instruct* MailMerge.

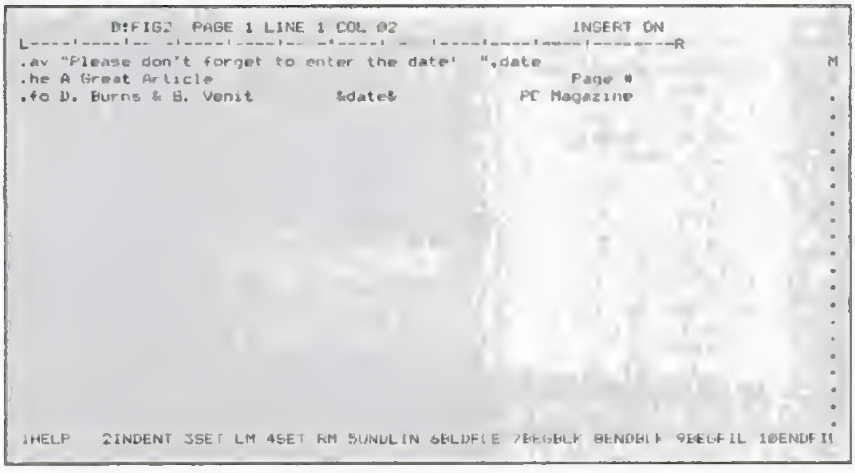

Figure 2: MailMerge *reminds the absent-minded writer to insert the date into the header or footer.*

for the file that matches the printout. This handy *MailMerge* feature can also be used to create personalized postscripts, operator identification, or almost anything you can dream up.

MailMerge also lets you create messages that will appear on the screen before the file is printed out. Insert the command .dm, and all the text in that line will appear on the screen when you print under the M option. You can leave notes for other users to read, instructing them to respond to questions about to follow (which you set up with .av). Even reminders can be displayed: "Remember to erase this file after you print it out." The message can be as long as you like, but each line must begin with .dm. This is ideal in situations in which users at different levels are using the same system.

As I mentioned earlier, *MailMerge* reformats each paragraph in which a variable occurs, conforming to the margin and justification settings of the main document. This feature is called print-time formatting. There are times, however, when you might not want the variable data you're putting in the main document to be reformatted according to the same margins, such as when inserting addresses. In these cases, turn off print-time formatting by inserting the command .pf off, and the inserted text will extend past the document margins, as in Figure 3. If you don't turn off print-time formatting, your text will conform to the document margins and *WordStar* will "word wrap" your inserted text, as in Figure 4.

(continued)

```
and this list contains the names and addresses of all the
really important people in the world:
Joe Small      123 Main Street      Santa Ave Maria, CA 99999
```

Figure 3: *Turning off print-time formatting allows you to extend text past the document margins.*

```
and this list contains the names and addresses of all the
really important people in the world:
Joe Small      123 Main Street      Santa Ave Maria,
CA 99999
```

Figure 4: *With the print-time formatting on,* WordStar *will wrap inserted text.*

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Not only does *MailMerge* let you turn off print-time formatting, but it lets you then imbed your own commands for printing out. This little-known feature creates tremendous possibilities. For one thing, it means that you can finally work on a document in one format and then print it out in an entirely different format without changing your edit file! The manual for version 3.3 does mention this, but some of the dot commands you can use to control your output were omitted from it. The old manual goes into much more detail, but it is harder to read.

This means it's possible to work on a document with justification off and print it out justified. Simply enter the dot command .pf on followed by .oj on. Print out under the M option and you've got yourself instantly justified text without having to go through and reformat. It's a good habit to work with justification off. For one thing, if you are searching for a two-word string (^QA in *WordStar*), *WordStar* will not be able to find the string if the justification process has inserted two spaces between the words. For another, if

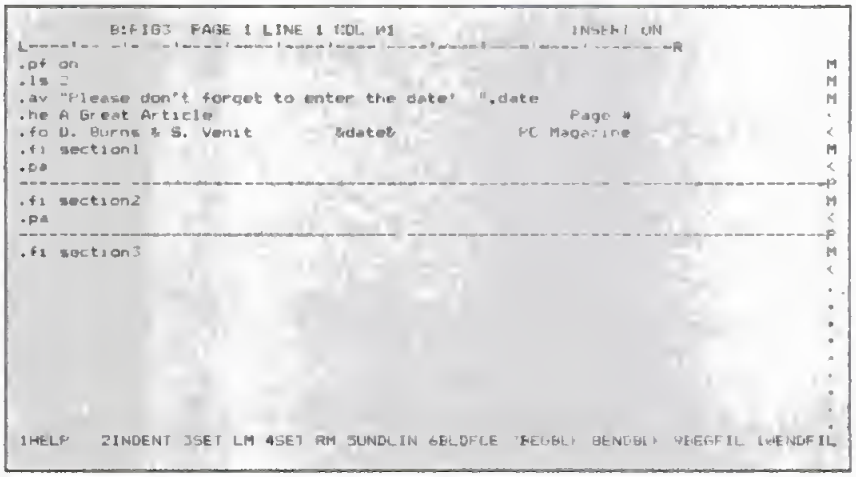

Figure 5: *You can create a command file before you print, instead of entering the commands as you work.*

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CIRCLE 369 ON READER SERVICE CARD

It's possible to work on a document with justification off and print it out justified.

you will be having your printout typeset, the typesetter will not want all the extra spaces that justification creates.

I was ecstatic when I discovered that *MailMerge* can print double-spaced copy easily. The 3.3 manual does not mention that you can turn print-time formatting on (.pf on) and then set the line spacing for your printouts (.ls 2). Editors and writers, rejoice! No writer likes to work with double spacing; it takes up precious screen display and makes editing more difficult. And no editor likes to work with single-spaced hard copy; it's hard to mark on. *MailMerge* makes everyone happy. Simply insert these commands at the beginning of your document:

```
.pf on
.ls 2
```

and when you print out it will give you the same results as using ^OS 2 in *WordStar*. *MailMerge* will reform paragraphs containing soft carriage returns, but it will not double-space lines ending in a hard carriage return (indicated by the flag "<" in the rightmost column of your *WordStar*

Changing The Dot Command Dot

The useful dot command can be inhibiting, especially if you like to use ellipses. Here's how to get around it.

Both *MailMerge* and *WordStar* make extensive use of dot commands, which consist of a period in column 1 of the *WordStar* screen, followed by a two-letter code. These little dot commands are powerful, and they can greatly alter the appearance of your document.

When *WordStar* finds a dot in column 1, it does not print out that line or send a line feed to the printer. It looks for the two-letter command to tell it what to do next. This means that you can never have a period in column 1 and expect that line to print. No ellipses are allowed at the beginning of the line, and if you want to write about dot commands themselves, it gets tricky.

It's easy to change the symbol that *WordStar* considers the beginning of a dot command from a period to some other, less frequently used symbol. *WordStar* can easily be patched to read a symbol like the exclamation point (!) as the start of a dot command.

First, make a copy of your current *WordStar* disk, including the file Debug.COM from your DOS disk. Type:

```
DEBUG WS.COM <Return>
F 395 L1 21 <Return>
W <Return>
```

The screen says "Writing 5380 Bytes" (or 5000, if on DOS 1.1 with *WordStar 3.0*) When you get the Debug prompt "—", enter:

```
Q <Return>
```

What just happened? In the line above begining with F, you told Debug to Fill location 395 in the *WordStar* program with a byte value with a Length of 1. The value to be put in is 21, the hexadecimal value of the exclamation point. So you're telling *WordStar* and *MailMerge* to look for !'s to signal the beginning of dot commands. The ! still has to be entered in column 1 when you're editing.

You can choose any symbol you like, but you should have a hexadecimal table handy to be sure you're entering the hex value of the symbol, not the symbol itself.

—D.B. and S.V.

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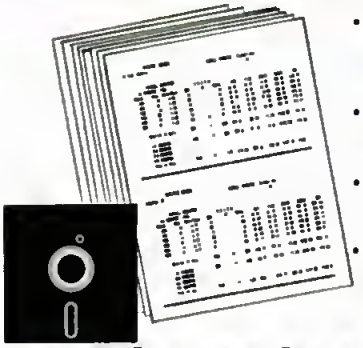

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MAILMERGE

screen). Most BASIC programs, for example, will not be double-spaced since most of the lines end in hard carriage returns.

There's yet another feature that makes

> No writer likes to work with double spacing and no editor likes to work with single-spaced hard copy.

MailMerge an inseparable *WordStar* extension. When I'm working on a document of any length, I like to make each chapter or section a separate file. *WordStar*'s no speed demon, and I find ten pages or so about all I have the patience to work on at one time, especially since markers can't be saved. How then, do I print out all these separate files? It's simple if you use *MailMerge*. The command .fi tells *MailMerge* to insert a file. By ending each chapter with a page break (.pa) and following it with a command to print out the next chapter (.fi chapter 2) I can have my text printed out in order, with the pages numbered sequentially. No more page numbering (.pn) commands. *MailMerge* does all the work. Instead of entering these commands at the end of each chapter as I go, I can create a command file at the end to do all my printing, "ask variables," and line spacing. My command file would look like Figure 5.

Dot commands make *MailMerge* an uncomplaining workhorse. Use it to manipulate your mailing lists. Send out form letters by the thousands with it. But also use it to get your money's worth out of *WordStar*. ■

Diane Burns and S. Venit are the authors of The SuperCalc Primer *and are working on two more books. They teach classes in* WordStar *for ComputerLand stores in the San Francisco Bay area.*

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Software Family Dynamics

What happens when you marry into a software family? A look at the capabilities of several integrated programs shows there are both advantages and drawbacks to consider.

The microcomputer industry has never been static. Technical developments and software trends constantly chase each other in an upward spiral that grows tighter as competition increases. Larger memory has created a competitive push to integrate individual software programs into families sharing common commands, special function keys, and file structures. These integrated families may appear to be one program with many functions, several programs called from a common menu, or separate programs with shared attributes. No matter what their specific structure, software families are intended to reduce training time and improve the effectiveness of the individual users.

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History of Families

If you apply a broad definition, *WordStar* was one of the earliest family packages for microcomputers. It integrated editing, formatting, and printing modules that some word processors still treat as separate pieces. *WordStar* allows you to call these functions from a menu and to do simultaneous printing and editing.

T/Maker II was a second early family system. This 8-bit CP/M program brought together word processing, spreadsheet analysis, and database functions into one well-integrated package. Its successor, *T/Maker III*, adds some graphics generation to the list of family talents.

T/Maker III is specially designed to provide excellent file-integration capabilities. You can create lengthy documents with the word processor and include large tables computed with the spreadsheet as well as various lists and reports generated by the database management system (DBMS). This integration is automatic, and the work appears on the screen and in print as one continuous document. *T/Maker III* has been criticized because it is a command-driven package that doesn't provide much help for the user; you have to know the commands or you won't get

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anything done. But the integration of functions and files in this program is excellent. (*T/Maker III* was reviewed in the article "T/Maker III Brews Up Text and Tables," *PC Magazine*, Volume 2 Number 2.)

The software integration movement really got rolling in the fall of 1982 when Lotus Development Corporation demonstrated *1-2-3*, and VisiCorp previewed *VisiON* at the COMDEX show in Las Vegas. The rest of the software industry took note of the crowds at these booths and decided that integration of some type was what the public wanted.

Context Management Systems had been in the market with *MBA*, but this integrated family didn't meet with the same success as *1-2-3*. It requires more memory, works more slowly, and has developed a reputation for being more difficult to use. The latest version of *MBA* adds telecommunications to the spreadsheet, graphics, and DBMS functions, so this family may take the prize for having the most capabilities under one family name.

VisiON is offered as an integrating scheme that will tie together the VisiCorp family including *VisiCalc*, *VisiWord*, *VisiPlot*, *VisiTrend*, and other packages. The software makes extensive use of graphic displays to call and apply the functions from the individual programs (a technique called "window management"). It puts a thick layer of buffering and interpretation between the user and the application packages.

Clearly, family integration on some level is an important factor in modern software development. Let's look at one family tree, *pfs:software*, to see if there is room where the branches attach to the trunk for desirable special applications software to perch.

The *pfs:software* family consists of four major packages: write, file, report, and graph. One strength of the family comes from the fact that the software currently runs not only on the IBM PC, Compaq, and other PC work-alikes, but also that it runs on Apple and Texas Instruments personal computers. This means that a business or professional organization can have several different types of machines and that workers can move between them without having to re-learn commands, special keystrokes, or other operating procedures.

The software integration movement really got rolling in the fall of 1982.

The write, file, and graph members of the *pfs:software* family can function independently. Report is designed to be used with the file program. Since the family shares a common command structure, let's first see how you put the programs to work.

Family Traits

You always can tell *pfs* users from people trained on other software. A *pfs* user thinks the Enter (Return) key is just like any other without any special command properties. The important key in *pfs* software, the key that commands all of the functions, is F10. That special function key under your left little finger gets heavy use in *pfs*. If you aren't familiar with *pfs* software, you can spend a lot of time punching Return and waiting for something to happen. If you know the software, you wonder why anyone would ever use any other key to make things happen.

These programs are all menu-driven. In some cases (particularly with *pfs:graph*) you have to work through several menus before you can finally see the finished product. The *pfs* command menus are as similar as the different program functions will allow. You move through the menus with the tab key and push F10 to go when you have made your choice. The arrow keys and paging keys work as they should and the backspace key is destructive. The Delete key causes the cursor to delete the character above it, not the one to the left as is the case with some programs. Repeated use of the delete function will pull characters in from the right and cause the cursor to gobble them up. You can pull characters from following lines and move them up with the delete function.

Each program package has a similar setup utility that configures it for the printer and video system in use. The installation utilities are not identical, and each package must be initially installed for each individual machine.

All *pfs* software is copy-protected, but the programs come with a special utility allowing them to be copied to a hard disk five times. The utility checks to see that the receiving disk has at least 2 megabytes of storage room before doing its job. This seems like a reasonable way to meet the manufacturer's perceived need for copy-protection and the hard disk users' real need to move the software over to a large mass-storage device.

The software runs fine under either DOS 1.1 or 2.0, but there isn't enough room on the disks to write the large DOS 2.0 COMMAND.COM file. This means you either have to install the software on a hard disk or boot DOS from a second disk if you want to use Version 2.0 with the *pfs* family.

Pfs software is remarkably resistant to crashes. I tried writing to full disks, leaving disk drive doors open, and telling the programs to do all sorts of impossible tasks. They always responded with polite and clear error messages and never crashed or hung up.

File Format

The files created by *pfs:software* are stored in a unique format. The format is common to the *pfs:software* programs and is credited by the manuals with providing fast access to the data. The programs can read standard ASCII files and files created by *WordStar*, *VisiCalc*, and other software, but the reverse is not true. *WordStar*

becomes very puzzled if it tries to read an original *pfs:write* text file. Spelling checkers go berserk. Similarly, most data communications programs either will quit early or go on forever if you try to send a file created by *pfs:software*. This is one of the main drawbacks to joining this kind of family group. The family is always ready to read mail coming in, but they want to keep family matters to themselves.

The method of obtaining a standard ASCII version of a *pfs:software* file for data transmission or editing by other software is simple, but it requires a few moments of time and some extra steps. The *pfs:software* print modules ask you if you would like to direct the output to a printer or to a disk file. If you select the disk file option, you get a formatted ASCII file ready for transmission or access. This works well if the ASCII file is a finished product, but translation to ASCII can be a cumbersome way to link *pfs:software* and non-*pfs:software* programs that are interactive.

Numbers—even numbers presented in neat rows—have limitations.

Reading the Tree Rings

Each member of the *pfs:software* family has documentation that is very similar in form and style. The manuals are printed on glossy paper, have many illustrations, include "Getting Started" and "What is . . .?" sections, and use clear functional descriptions. Each has a complete table of contents, index, and glossary. The manuals also include a list of error messages and their possible causes. The documentation is first-rate, and the high quality is maintained across the family.

Now that we have seen some of the general family traits, let's see how individual members of the family measure up.

Pfs:write

Pfs:write is a good word processor that can meet most needs. I would rank it with *VolksWriter* in ease of use. It has all of the standard functions, including block movements and editing, search and replace, insertion, and centering. The special function keys are well integrated and give you fast movements to the start or end of a line, word and line deletion, underlining, boldface print, and block functions. No control keys are used. The F1 key will call graphically designed Help screens that describe

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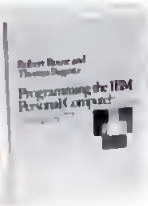

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the functions in use and menu alternatives.

The limitations of the program are few, but they might impact on its use for some professional and office applications. *Pfs:write* cannot display anything but single-spaced text, so what you see on the screen is not what you will see on paper if you are preparing manuscripts or other double-spaced material. It will not allow you to prepare a document with a right margin beyond 80 columns. It will insert a "slug line" or header at the top of each page and put a footer at the bottom, but you get these additions on every page, including page one! The program provides no hyphenation capability, but whole words are wrapped to the next line and the text is automatically adjusted. Right justification is not provided. Finally, the package is RAM limited. It can handle only about 13 pages of single-spaced text. You can use a Join command to bring files together during printing, but this still leaves the editing of the entire document a cumbersome chore.

The program can make good use of a color/graphics board and color monitor display. The screen display includes a ruler line and two status lines that show the line and page number (correct only if you are single spacing), status of the insert mode, the amount of RAM used, and other factors. On a color monitor, the text comes up with white characters on a blue background. The colors cannot be changed, but underlined and boldface print are shown in reverse color combinations.

By itself, *pfs:write* is an excellent letter-writing tool, and, as we shall see, it has good capabilities for preparing mass mailings. But it would be limited in some applications where specialized and "non-letter" text is being prepared.

Pfs:file

Think of *pfs:file* as an automated filing cabinet. You can use the program to create a form and then file as many copies of that form in the cabinet as your disk file will hold. An otherwise empty DOS 1.1 disk will hold about 2,200 forms. The one limitation is that each drawer of the filing cabinet (each disk file) must have only one type of form in it. A form can have several parts and you don't have to fill in all of the blanks on any one form, but you can use only one type of form per file.

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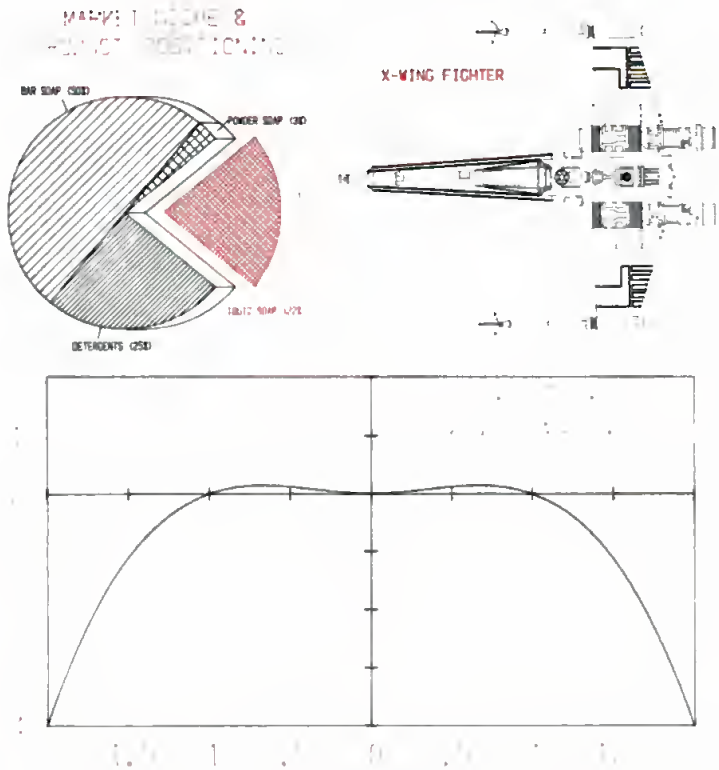

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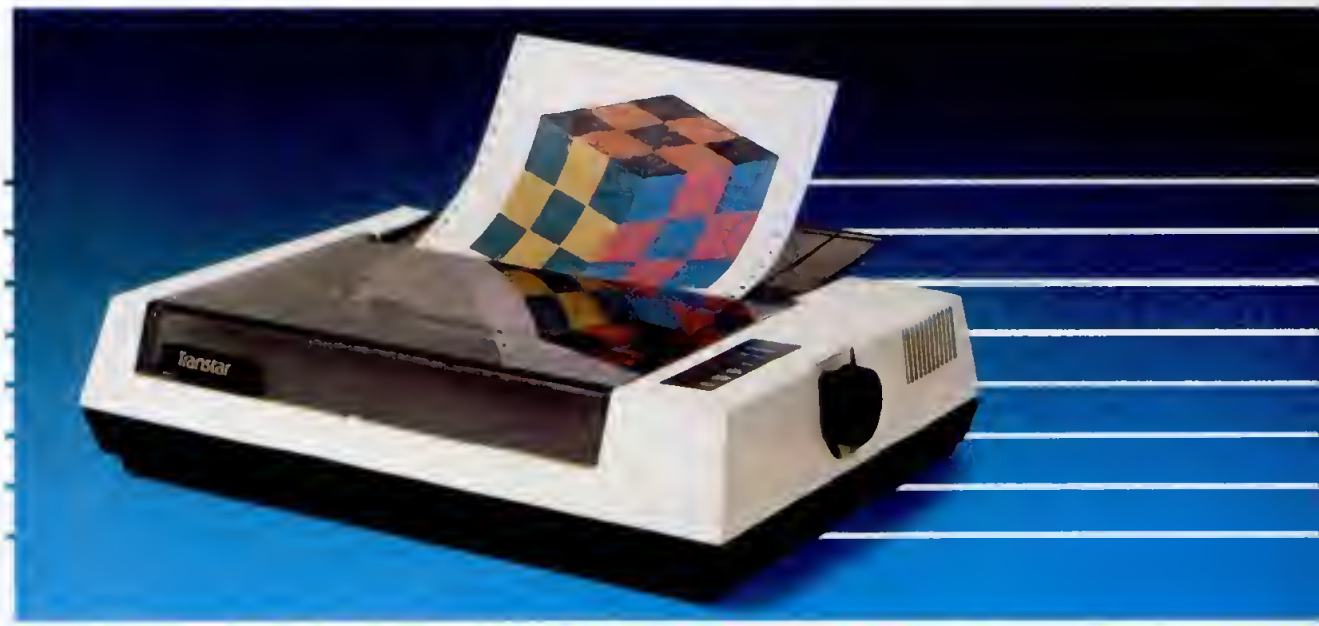

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from the file. Selective sorts can be made based on one or several data items in the forms and on logical arguments, such as more than, less than, or equal to. The selected forms can be viewed, updated or printed.

The most common example for the use of this kind of program is a set of personnel data files. Each form in this file could hold such data as the name, social security number, employee number, birthdate, employment date, department number, and monthly salary for each employee. The blank form could be designed so that the program checks the data as it is entered for logic. This means, for instance, that the name section would allow only the entry of alphabetic characters and the salary block would not allow the entry of numbers exceeding a specific range. This kind of editing can eliminate gross errors from getting into the database; it represents one of the advantages of an automated system.

Other advantages of automated filing include the ability to withdraw forms quickly, and, most significantly, when forms are "withdrawn" for use, they aren't really gone! Office workers don't have to chase pieces of paper from desk to desk when they have been removed from the cabinet. The forms can be retrieved by different workers as they are needed.

Retrieval is as simple as entry. A blank form is called to the screen and the desired data entered into the necessary blocks. The program then searches through the file to find all of the existing forms with data elements matching those on the key form. If you want to find all employees in Department 51 making more than $1,000 a month, you simply would select the search function, call a blank form, enter 51 in the department block, and enter >1000 in the salary block. The program would then search for and retrieve all forms meeting those conditions. You can page through the forms and change or print individual forms very quickly.

The ease of use and performance of

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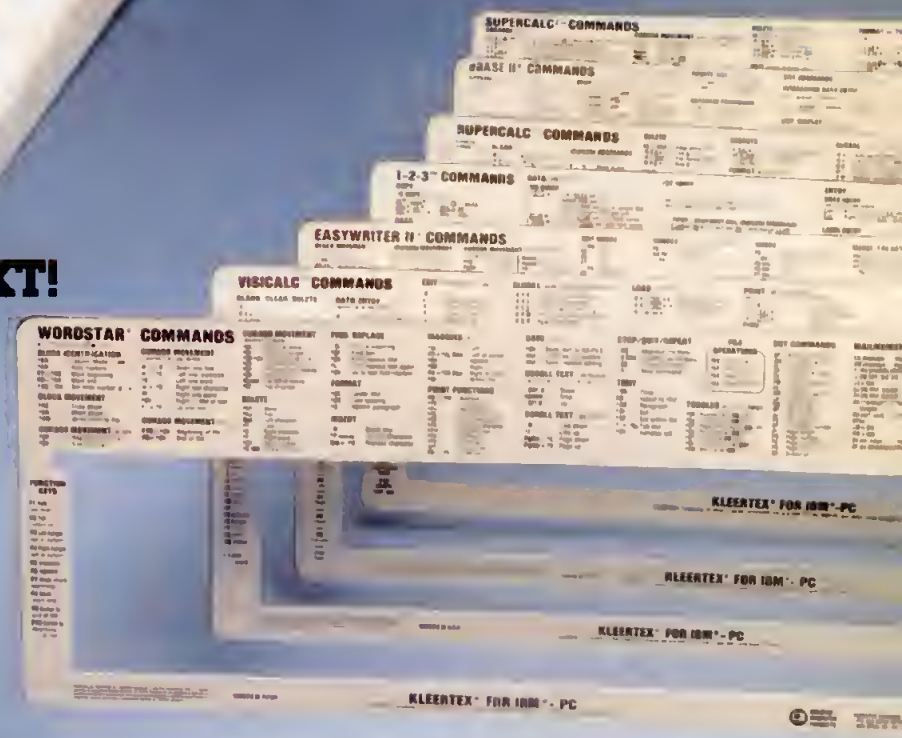

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pfs:file are both impressive. Form design is the most critical portion of the program, but the screen display makes the process simple if all of the data is available. The form design can be modified, but this process takes careful planning. You can easily add new categories where no data presently exists, but if you eliminate a category or truncate the space for an entry, the program will issue an error statement and refuse to accept the new form. Data entry and retrieval both are simple functions that can be performed by persons with very little training.

The ease of use and performance of pfs:file are both impressive.

The *pfs:file* program is a valuable record-keeping tool. It functions quickly and efficiently. But, like a filing cabinet, you can retrieve only the same forms you put in. The computer will not rearrange the data to give you summaries or different presentations of the data it contains. Those functions are performed by two other programs: *pfs:report* and *pfs:graph*.

Pfs:report

The *pfs:report* program is designed to be used only with *pfs:file*. It makes use of the form designed for *pfs:file* and uses that form to retrieve information. When it retrieves the information, it can present it or print it out by category instead of by form. Summaries of categories can be developed, and mathematical functions can be performed on the summaries.

In our example of personnel files, we could use *pfs:report* to prepare a listing of the names and salaries of all persons in Department 51 earning more than $1,000 a month. We could instruct the program to sum the salaries and then to divide the sum by the number of employees selected to determine a numeric average. This report would be printed in a format we design

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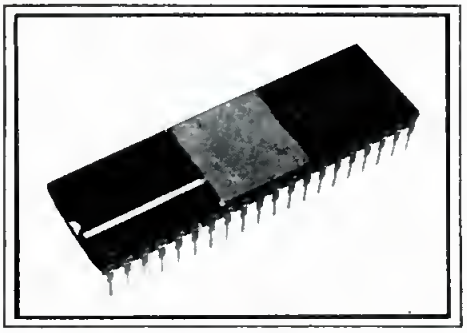

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with specific headings, columns, and rows. The format can be saved and the report can be regenerated as frequently as needed.

Pfs:report is slightly more complex to use than *pfs:file* because of the format design process. The data-retrieval process is simple. But you have to design the output format to fit both the size of the data elements and the screen or printer you use as an output device. You also have to develop and enter any formulas you want to use to manipulate the data. However, this has to be done only once for each report.

When you add *pfs:report* to *pfs:file*, the combined program has most of the attributes of a complete relational database management system. The combined system lacks some of the built-in math functions found in other programs, but it does include strong built-in formatting functions, such as decimal-point alignment of numbers, counting entries in a column, giving subtotals, and accounting for page breaks when printing reports.

However, numbers—even numbers presented in neat rows—have limitations. Often a chart or graph can demonstrate a relationship between the numbers that isn't clear in a printed report. If you are a member of the *pfs* family and you want to see a graphic illustration of some numbers, you call *pfs:graph*.

Pfs:graph

The *pfs:graph* program can be used in the standalone mode. As is typical of the family, it can read files, such as DIF files prepared by *VisiCalc* and other spreadsheet and DBMS programs. It also can accept data inputs from the keyboard.

Pfs:graph can produce line, bar, and pie charts. The bar charts can be of the stacked variety that illustrate a great deal of data. The charts can be displayed in color if the PC is equipped with a color/graphics adapter. A good selection of printers can be used, including the IBM graphics printer, Epson MX-70, MX-80 and MX-100 with *Grafitrax*, IDS Prism (not color), and the Okidata 80 series with the graphic ROM. It will plot charts with the Houston Instrument HiPlot, Hewlett-Packard 7470A, 7220, and 7225, Strobe 100, and Sweet-P plotters.

An extensive menu is used to design each chart. The menu allows you to enter the titles and labels you want on each graph, select the X and Y axes, and use other features, such as color and grid divisions. It is relatively simple to switch between the configuration menu and the chart to see what effect your changes make on the final drawing.

If you use *pfs:graph* to draw information from a data file created by *pfs:file*, you are again greeted by the form used to store the data. *Pfs:graph* can perform some analysis of the data it retrieves through the use of the forms. It can select very specific items from a data field, such as reading only the days from the date field. It also can sum data contained in a specific field on many charts and display the totals graphically. You might, for example, want to see the sales figures for the first half of the month compared to the figures for the second half. The program could read the dates and sum the appropriate item for each date in the correct category. In this way, *pfs:plot* duplicates some of the capabilities of *pfs:report*.

If your need for data manipulation exceeds the power of *pfs:graph*, you will have to use *pfs:report* and either enter the data manually or create a new form in a new file containing the derived data.

This member of the *pfs:software* family is a good program; it is relatively easy to use and it has interfaces for a number of different output devices. But the program lacks some features found in other modem graphics software. It does not allow for different fonts to be used in the labels or titles of charts. It does not allow you to select the color or shading patterns used on the charts. These limitations are not critical, but again they might be a problem to a professional office desiring the ability to turn out really sharp charts using specific

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FAMILY DYNAMICS

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The Family Plays Together

The front-end benefits of using e software family (common training, documentation, keystrokes, and other operating features) don't represent all of the things that family life should bring. There should be some real synergism between the family members that increases their total value. The *pfs:software* family benefits from being able to call on each other in the middle of an active program. This means that as *pfs:write* is printing a document, it can call in names and addresses from *pfs:file*. The *pfs:graph* program can seve e "picture" of a graph it creates in a file that can be read by *pfs:write*. This picture is a dot image of the final graph that is saved in the same format used by IBM BASIC's BSAVE command. The files generated by *pfs:report* can be called in, and a report can be used as a part of the printed text.

These abilities mean that *pfs:write* has the potential to produce complete documents that include graphics and some variable material drawn from a sequence of records. It has the ability to generate personalized form letters that might even include a different chart or graphic image for addressees who share some specific demographic feature, such as zip code or age group. It can be used to produce illustrated reports with data tables and charts that change according to specific characteristics described in the forms used by *pfs:file* and compiled with *pfs:report*.

The only slight drawback to this mixing of programs is the mechanical problem of leaving enough room on a page of text to bring in a graph, report, or form. Since *pfs:write* does not display the data it borrows from its family members, you have to plan ahead to allow for 18 blank lines in the document for a graph and the needed space for addresses or reports. If you want to include several borrowed entries in one long document the planning can be tedious. Some small line adjustments in the beginning of the document may change the position of entries in the last pages.

In a Family Way

Another advantage to family life comes from mutual support. A company that takes the time to put out a family of software would seem to be more likely to support it than a company thet markets one program and then leaves it an orphan. Software Publishing Corporation has organized a *pfs* Users' Group, and it publishes a quarterly multi-page newsletter describing different applications. One small example of the support Software Publishing provides: I called with e technical question on the language used to write the original software (Pascal). The technical department was busy at the time, but they called me back (Califomia to Virginia) and answered my question within 10 minutes. I had not identified myself and the company didn't know I was doing a *pfs* review.

Locked In?

Finally, we come to the question of the transportability of data between family end nonfamily software packages. The *pfs:software* family seems to be able to use data prepared by other programs. It can read and use ASCII files, DIF file, and BSAVE picture files. But outside software may have problems reading the files created by a *pfs* program. This can raise problems if you want to link the output to other software on a regular basis. As an example, I might wish to use the output of *pfs:report* as the input to a tax-preparation program. If I want to do this once a year, it is no problem to "print" the report to disk as an ASCII file and run the tax program against it. But if I wanted to look et the tax position of various clients on a regular basis, I would want to find a different DBMS to prepare my reports.

Joining a family has advantages and drawbacks. You gain mutual support and familiarity; you lose some ability to pick end choose your friends. Will you go it alone or choose the family life? ■

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Making Peace With 1984

For 35 years, we've lived within its shadow. Now the time of truth has arrived, bringing Orwellian overtones and one unavoidable question: Is Big Brother watching?

Welcome to 1984. If that sentiment doesn't give you a little chill, you're showing your youth. For many of us who grew up in the fifties and sixties, this New Year's Eve had an unsettling edge. For despite the parties and frivolity, in the back of our collective consciousness was an uneasy remembrance of George Orwell's dark, threatening novel of a utopia gone wrong. *1984*.

Orwell wrote, in 1949, of a fictional time when information was power, and power was everything. Big Brother watched all; Big Brother knew all; Big Brother's telescreens recorded all.

"The Party said that Oceania had never been in alliance with Eurasia. He, Winston Smith, knew that Oceania had been in alliance with Eurasia as short a time as four years ago. But where did that knowledge exist? Only in his own consciousness, which in any case must soon be annihilated. And if all others accepted the lie which the Party imposed—if all records told the same tale—then the lie passed into history and became truth. 'Who controls the past,' ran the Party slogan, 'controls the future; who controls the present controls the past.' "

All through my high school and college years, "1984" was perceived as a threat. We demanded free speech to keep Big Brother away; petitioned to ban the bomb to forestall the Ministry of Peace's "War is Peace" campaign; and extolled the universities as ivory towers to give the lie to "Ignorance is Strength."

Corey Sandler

And there were times—no matter which side of the political fence you came down on—when it seemed as though the Cold War of the fifties, or the Cuban Missile Crisis of the early sixties, or the assassinations, war, protest, and turmoil of the late sixties were leading us right to the door of the Ministry of Love (whose purpose was hateful).

Nevertheless, I never really thought of our actual arrival in the year 1984. We could leap, with Arthur C. Clarke, to 2001 and a wonderful time of rebirth and renewal. We could journey to distant yet familiar galaxies with the starship Enterprise, or frolic through funny phantasmagoric utopias created by Woody Allen. Somehow, we would avoid landing in that year between 1983 and 1985.

Well, folks, I guess we have arrived. But where are we?

Back to the Book

Like many others, I reread Orwell's *1984* just recently, looking for the answer. I wanted to know if Big Brother had slipped into our midst, or if somehow—he had been repelled at the borders.

I mixed the book in among my other reading one week, picking it up and putting it down between passes at work in my electronic office, where I write books and articles on a telescreen that is linked into a common communications network, in a house where the climate, security, telephones, and cooking facilities are all removed from our concern by hidden microprocessors, and in an age that includes its share of Newspeak and Doublethink (our president calls a destructive new missile the "Peacekeeper"; the Soviet premier justifies the shooting down of a civilian airplane—it's not his fault and no big deal anyway; the newspapers report of "START" talks to *end* missile madness, based on a process of construction/reduction called "build-down").

Also in my mix of books that week was a recent best-seller, a superb piece of

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.EXE file size (in bytes)	**4608**	27136	10752

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SANDLER'S SCREEN

reporting called *The Puzzle Palace* by James Bamford. The book is an unauthorized snoop at the National Security Agency, this country's huge, and almost totally unseen, secret intelligence organization. Under the guise of national security considerations, the NSA has taken full advantage of our world of electronic telecommunications to automatically and imperceptibly look into all of our affairs, Bamford writes. He continues:

"Thus, by having four strategically placed satellite antenna fields located near the COMSAT earth terminals and several average microwave receiving horns stuck on a rooftop or hanging on the side of an obscure tower near the various cable heads, the NSA should be able to monitor continuously nearly every international telephone conversation or message to or from anyone in the United States. Such a power could have been fantasized only by Orwell."

Orwellian Questions

I found myself thinking about our world in 1984. Have you ever driven up a suburban street on a summer's evening and seen the flickering glow of television through *every* open parlor window? Have you noted how quickly a single phrase ("Excuuuuuuse me!") can leap into our national consciousness overnight? Have you considered how our political candidates are now being chosen on the basis of their packaging and not their content? And the most Orwellian question of them all: What has the computer done to our privacy when there now exists the possibility (and occasional reality) of a computer network that links the desks of every bureaucrat, banker, policeman, journalist, spy, tax collector. . . .

And what about the *War Games* syndrome—the growing legion of computer hackers whose play from their homes or businesses involves searching for ways to break into government and corporate computer systems for fun and profit?

One of the ironies I noted while rereading *1984* was the absence of computers, at

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CIRCLE 161 ON READER SERVICE CARD

least as we know them today in George Orwell's writing. In the world of *1984*, the Party members *were* the machines, performing machinelike tasks in the process of "correcting" history to make it consistent with the present. (There was a seriocomic passage about that ultimate word processor that we writers always dream of: "He did not know her name, but he knew that she worked in the Fiction Department. Presumably—since he had sometimes seen her with oily hands and carrying a spanner—she had some mechanical job on one of the novel-writing machines.")

With the computer's gift to writers of speed and efficiency comes the loss of an archive.

Orwell's computer analogies, though, were apt. The heart of Big Brother's control over the society was his ownership of the collective Random Access Memory ("He who controls the past controls the future").

Losing Literary History

What are computers doing to literature? In *1984* the Party machine was busily engaged in rewriting all of the classics to conform with orthodox thought and to remove any inappropriate *doubleplusungood crimethought* ("Under the spreading chestnut tree, I sold you and you sold me"). Now, though, we writers hail the coming of the word processor as the greatest boon to productivity since we put down our hammers and chisels and picked up the paint brush. But Pulitzer Prize-winning playwright Marsha Norman, in her interview with *PC* last summer ("Marsha Norman: A Broadway Playwright Collaborates With The PC," *PC*, Volume 2 Number 3) pointed out that with the computer's gift to writers of speed and efficiency comes the loss of an archive. Historians today still pore over the remaining handwritten drafts of plays by Shakespeare or novels by James Joyce or stories by Mark Twain to chart the development of a masterwork.

With a word processor, the end product may be produced quicker and may even be better, but all of the rewrites and block moves and searched-and-replaced character names will be lost in an electronic ether and therefore *will never have existed.*

And what about civil liberties? If all of the educational, financial, and personal data on our lives are to be maintained inside the volatile memory of a computer database, what tangible proof do we have of our passage? Could not my very existence be wiped out by some ERASE SANDLER.* command? I would become, in Orwell's term, an unperson.

" 'Does the past exist concretely, in space? Is there somewhere or other a place, a world of solid objects, where the past is still happening?'

'No.'

'Then where does the past exist, if at all?'

'In records. It is written down.'

'In records. And —?'

'In the mind. In human memories.'

'In memory. Very well, then. We, the Party, control all records, and we control all memories. Then we control the past, do we not?' "

But I am at heart a cautious optimist. I believe that if we keep our eyes and ears and minds open, we can fight off the assaults of Big Brother and Big Government and Big Business. Computer hackers and computer users can, if they choose, use their powerful tools as guardians of their privacy. We can use our computers as windows to the world instead of allowing them to be used as spies in our midst.

We can, if we try, make Orwell's *1984* a footnote in literature. But never let it be said that George Orwell's novel was off the mark: *1984* may fail as prophecy if it succeeds as warning. ■

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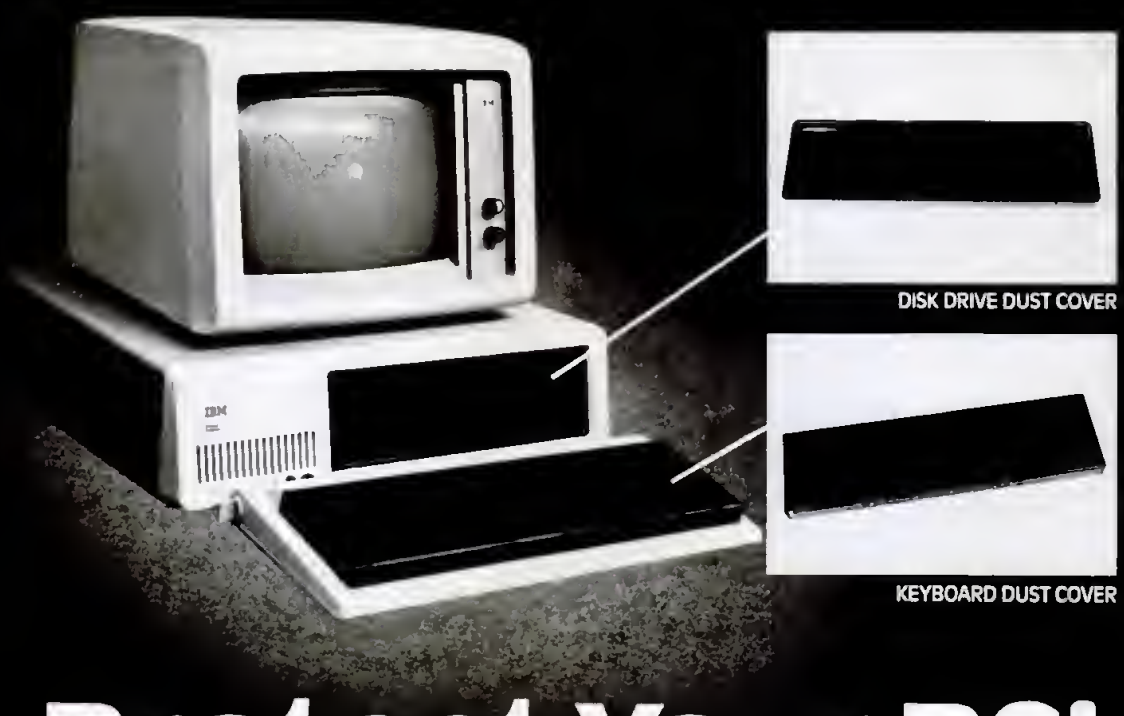

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It's Not Easy Being Green

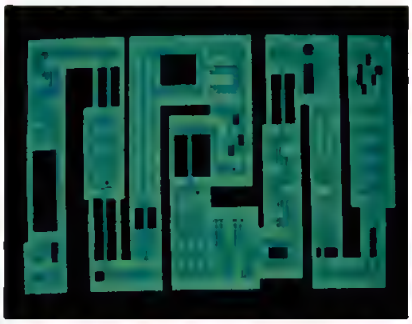
Finally there's a game package created especially for monochrome snobs. But unless you're a maze maniac, it may send you back to the frogs.

PC-Land is inhabited by two types of people: we sobersided, industrious owners of monochrome monitors—hard-working souls who keep the economy moving—and you frivolous, irresponsible users of color/graphics cards, frittering away your time on unproductive recreational pursuits. But sometimes even a monochromer needs a break.

Well, nyaah, nyaah, nyaah, all you graphics card owners! We monochrome types, dullards though you may consider us, finally have a game of our own. Not, mind you, another pale chartreuse version of what you multichromers view in vibrant shades of puce, vermillion, and ochre. No, this is the genuine article, a game program solely for us intellectual giants who look upon childish things with haughty disdain. See that notice right up there at the head of this article? "Requires IBM monochrome monitor." Neither the amber avant-garde nor you card-carrying colorists need apply.

One Hundred And One Monochrome Mazes
IBM Corporation
P.O. Box 1328-C
Boca Raton, FL 33432
List Price: $35
Requires: 64K RAM, one disk drive, IBM monochrome display.

CIRCLE 797 ON READER SERVICE CARD



The first level of mazes is fairly simple and straightforwsrd. This is Maze 7.

This program doesn't come in any Ziploc bag. It arrives in a flannel-gray IBM plastic binder. And look at the brilliantly imaginative logo they've come up with: "A*mazing* fun for the whole family." Clearly some bright monochromer at IBM has a way with words. All monochromers, of course, are gifted.

Masterpiece Theatre

And what a classy introduction. "For millenia," the manual begins, "man has made mazes." High-tone stuff like that doesn't come with putative amusements about amphibians getting knocked off by tractor-trailers.

The manual claims that you have to start up the program with the machine off or perform a three-key system reset. That's a polite fib so that you'll get to see the clever programming trick planted in the AUTOEXEC.BAT file. When you invoke the program, you get the message " 'Abandon hope, all ye who enter here.'—Dante." The trick, of course, is that everything past the 'abandon is ignored by DOS. The file that's then invoked is named 'abandon.exe. Being a monochromer, you are smart enough to realize that you can type the filename in right from the DOS prompt.

You cannot avoid the classic IBM logo as the program begins, but why on earth would you want to miss the symbol that proves you bought The Right Stuff? Then the program plays a musical fanfare, and *One Hundred and One Monochrome Mazes*' own logo appears.

You then select a series of options: number of players (1–8), marker speed for each player (1–9), type of scoring (counting points, keeping time, or, for the most timid or sporting, no scoring at all), full sound effects or not, and the number of the maze you want. The mazes come in ten graded difficulty levels, plus number 101, the toughest. If anyone has played for points at the level of the maze you've selected, the "Hall of Fame" for that level is displayed—the top three point scores and the initials of the scorers. Pressing the spacebar then gets you the message, "Hold tight! You are being transported to Maze X".

The mazes consist of light and dark

green shaded blocks, and black spaces that are "pools"—fall into one and the game is over. The dark green areas make up the path, and as long as you manage to stay on it you're safe. The light green areas are the walls of the maze. If you bump into them, you'll bounce right off, and if you're not careful, an unexpected bounce can land you right in a pool. You, incidentally, are a light green square. Don't take it personally.

At level one (the first ten mazes) pools and walls are the only problems you have to contend with. After that things get trickier. You think you're going down the right path when an "invisible wall" suddenly pops up in front of you. These have an uncanny way of bouncing you into a pool. They always come up in the same place, though, so you can memorize their positions and either avoid them or prepare a course of action.

Even more fearsome are the trap doors that can suddenly open up behind you. These look and behave exactly like pools—fall in and you die. They can be especially tricky if you bounce off a wall and then discover a trap door behind you. There are also gates that slam shut behind you, blocking your retreat. The gates are less dangerous than the pools and trap doors, but they can bounce you into either one. Like the invisible walls, the gates and trap doors always pop up in the same place. Memorizing them is mandatory at the game's higher levels.

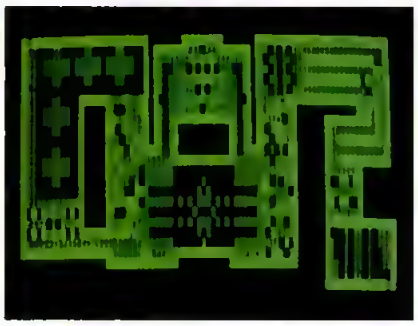
One final thorn: the paths through many higher-level mazes aren't always obvious. They may be broken up by pools one block wide.

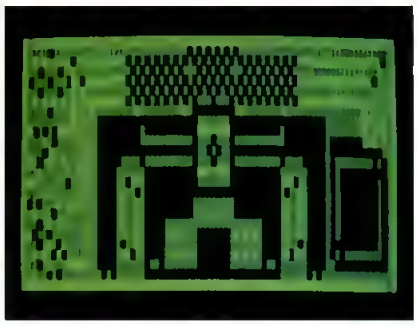
You may study a maze for as long as you want before you begin. Once you start, you can change direction with the four arrow keys. Your marker has momentum of its own, depending on the speed you picked at the outset. You'll continue blithely the way you're going until you command a change in direction from the keyboard or until you bump into a wall, which causes you to reverse direction.

The paths through higher-level mazes may be broken up by pools one block wide.

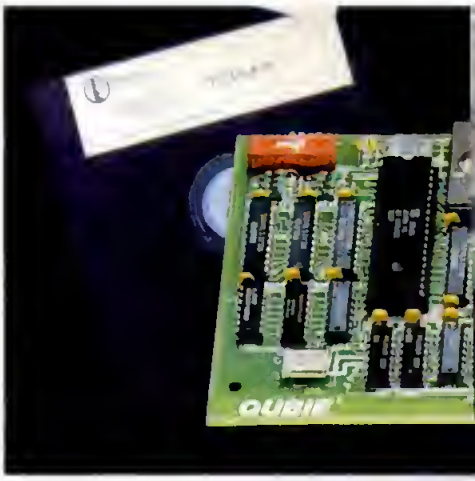
If you hit the arrow key that points the same way you're heading, you'll jump the next square. This is the basic technique for leaping across pools one square wide. That's easy enough to do when you're moving slowly, but mistime the jump and you land in the drink. To go around a bend and jump a pool, you need a running start of two squares on the side of the pool after you turn.

And that's all there is to it, except perhaps in maze 101. The manual implies that that maze adheres to different rules, and gives hints about jumping over untripped trap doors and gates.





The more advanced mazes are often beautiful and complex, reminiscent of Greek labyrinths and Victorian topiary mazes. These are Maze 81 (left) and Maze 92, two of the more challenging mazes in the package.



Flip the pages. You see PC modem cards with fewer features advertised for as much as $599. Up until now that's how much it cost to make a modem capable of transmitting at 120 characters per second (1200 baud). It doesn't take a computer to figure out the savings in phone line charges when you communicate four times faster than the 30 character per second modems (300 baud). Now you can have the solution to your communication needs at an affordable price.

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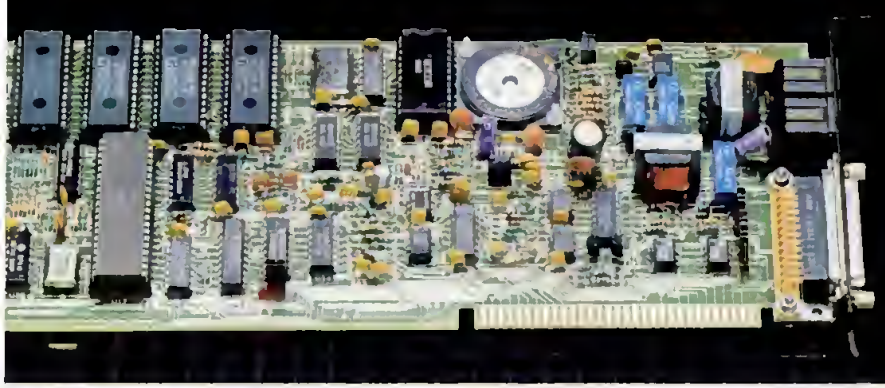

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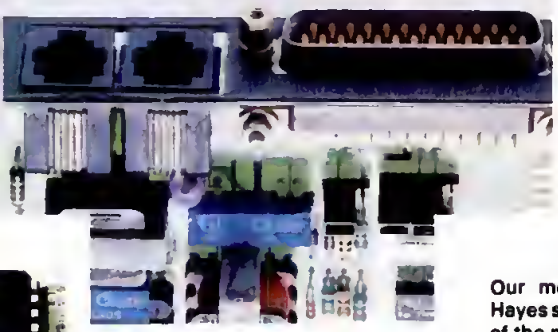

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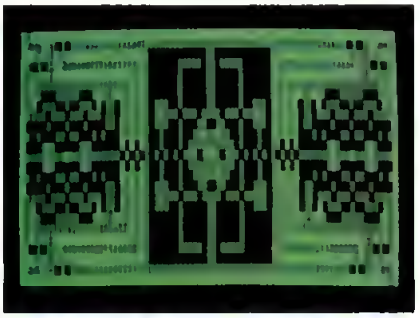
I'll say Maze 101 is different! For no reason I could determine, it repeatedly gave me ego-gratifying scores of 715,643 and 681,660 for performances that did not strike me as terribly impressive. I'll take 'em, though. At the same speed (3) on maze 98, the best I could manage was 51,759 points, and at level 1, all I could muster was a meager 9,350. According to the manual, your score goes up with the number of the maze and your marker speed, and down the longer you take to complete the maze. You don't have to finish to get a high score, however, as I found repeatedly with Maze 101.

The scoring is weird. You may end up with more points by timidly crawling to a particular spot than by blithely hopping along with the arrow keys. Loitering doesn't gain you points, but it doesn't lose you any, either.



The dreaded Maze 101. The manual hints that it has rules all its own, but it is easier to run up a high score.

Switching from one maze to another is fairly quick.

If you've been playing for points and come up with one of the three highest scores for the current level, you're asked to enter your initials in the maze archives. You can also race against the clock, which has the virtue of being absolute, but you don't get a time unless you finish. The Hall of Fame doesn't keep track of time scores.

As you make your way around the maze you hear an occasional beep whether you've chosen sound or not. It seems to have something to do with hitting the walls. If you've picked the sound option, you get a little victory tune as a reward for finishing a maze, and a downward glissando-cum-razzberry when you fall into a pond. The program's response to an invalid menu entry is a three-note error tune that sounds suspiciously like the

(continued)

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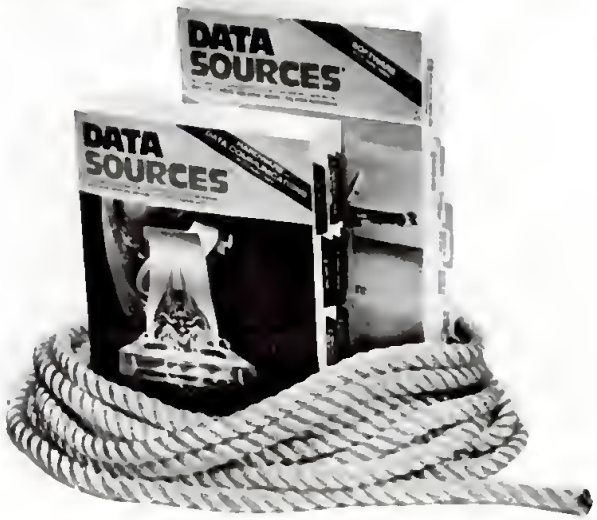

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opening of the old Gillette Blue Blades "Look Sharp" theme.

After each game, there's a short wait while the program restores the maze and brings you back to the starting point. After each full round with more than one player, you get a summary of the scores for that round. The program does not keep cumulative scores or times.

To change any of the game parameters, you hit Esc while the marker is on the starting block. Switching from one maze to another is fairly quick, but to change

After a while, Greek, Roman, Victorian, or Venusian, the mazes all start to look the same.

anything else, including your marker speed, you must wait for the full menu. If you decide you've had enough, press the appropriate key (the screen prompts you) and the message "Goodbye" will appear.

The manual warns you, and it's absolutely imperative, to adjust the contrast so that it's easy to see which of the three brightness levels is which. You, fellow monochromer, guessed that already.

Amphibians On My Mind

There's just one problem, friends. True, there are 101 different mazes, and they do vary greatly in their difficulty, and the speed options do make things even more interesting. But after a while, Greek, Roman, Victorian, or Venusian, the mazes all start to look the same. After awhile you get kind of numbed out.

Come to think of it, amphibians aren't so bad. Aristophanes even wrote a play about them. That's certainly classical enough for anybody. And who among us would dare attack a cultural institution like Kermit? Besides, when you look at it rationally, this screen's really just the right color . . . . Send in the frogs! ■

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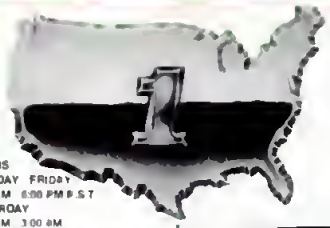

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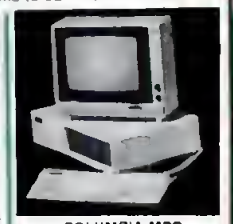

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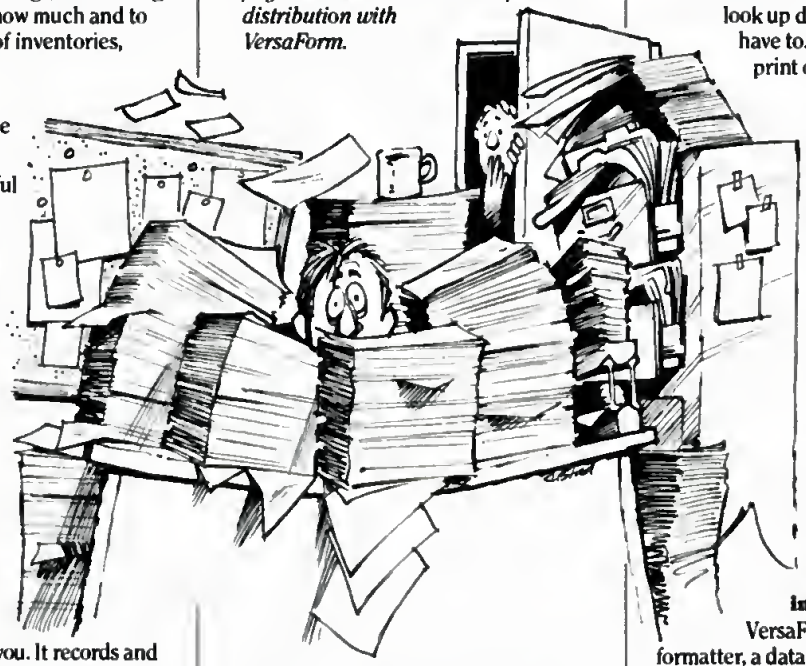

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Living And Communicating

A collection of philosophical essays and an information-packed handbook on communications sources both include useful material for PC users at every level of experience.

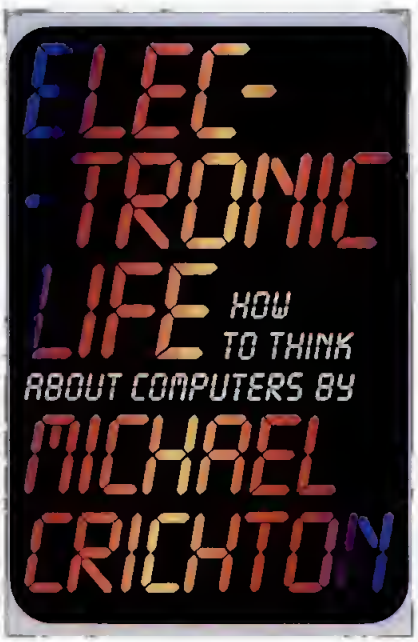
Books aimed at microcomputer users are overflowing bookstore shelves and dominating many displays. B. Dalton Bookseller, for instance, ran a 20-page color advertisement devoted solely to books about computing in the September issue of *Scientific American*. The number of books being published on this subject is growing exponentially.

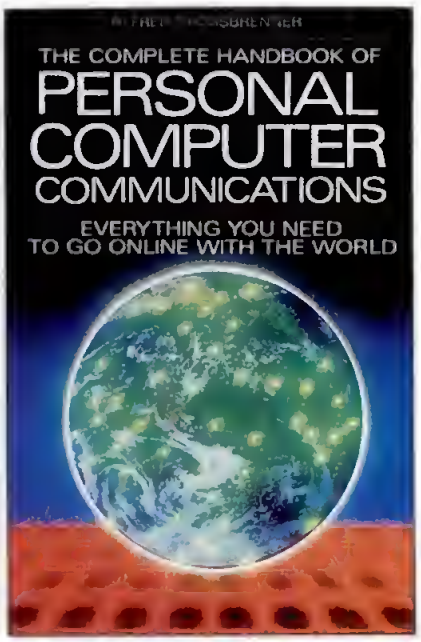
Many of the titles that have appeared on bookstore shelves are primers for novice users of the computer. They are written to help the neophyte overcome the trauma involved in mastering a new and complicated piece of equipment. Now there's yet another new book aimed at the reader who has just bought a new computer. If you're an experienced hacker and think this is old hat, don't hit the DEL key yet—this book is different. Michael Crichton's *Electronic Life: How To Think About Computers* has something for anyone with an interest in computers or computer technology.

Two factors set Crichton's *Electronic Life* apart from other computer books. First, Crichton is a well-known science fiction writer—and he writes well. A graduate of both Harvard College and Harvard Medical School, he is the author of such best-sellers as *The Andromeda Strain* and *Congo*. He also directed such movies as *Westworld*, *Coma*, and *The Great Train Robbery*. Though the literary merits of his novels have been debated, his sci-fi treatment of biological subjects is provocative and knowledgeable, thanks to his medical background.

The second distinguishing factor is Crichton's common-sense approach to new and often confusing technology. His simple and practical approach to the subject matter is reassuring to the first-time computer user, who often must overcome a degree of technophobia before feeling truly at home with the machinery. Crichton never allows the reader to forget that it is the user who controls the machine, and not vice versa.

In the introduction, Crichton explains that *Electronic Life* started as a series of notes for friends who had just bought home computers. These notes were expanded into a series of mini-essays





Electronic Life
Michael Crichton
(Alfred A. Knopf, Inc., New York, 1983)
209 pages; hardcover $12.95

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arranged in alphabetic order under topic headings. Some of Crichton's entries are only a few sentences long; others go on for several pages.

The entries start with the topic heading "Afraid of Computers," and before Crichton works his way through the alphabet, he manages to cover a great deal of computer-related material. Just about every subject of interest to the first-time computer user is covered—and not just the nitty-gritty about the machine and its workings. Philosophical considerations about the relationship of man to his new machine are discussed as well. It may not be classical philosophy, but readers interested enough in computers to read this book will relate well to it.

Crichton's philosophical bent leads him to some fairly off-beat topics. Here are some samples:

- *Computer calvinists.* (Calvinists regulate things. So far, their Computer Age counterparts haven't messed much with computers, but Crichton fears the worst and hopes "that for once in the twentieth century, a new technology will stay free" of "Calvinist" control.)
- *Computer converts.* (Says Crichton: "As with the reformed hooker or ex-smoker, beware the zeal of the computer convert. The most vigorous opponent of the machine becomes its most intemperate advocate.")
- *Feeding the dog.* (Crichton points out that "at the moment there is no commercially available Dog-Feeding Peripheral," but there probably will be. His point is that computers can do a lot of things. In fact, they can do almost anything you want.)

In addition to the off-beat, Crichton offers commentary on mainstream topics. Among the subjects he covers are:

- *Computer art.* (Crichton considers computer-generated writing, music, and programming as computer art. Computer art is really "human artworks possible only with a computer." They "inevitably show the traces of their human creator."
- *Documentation.* (Crichton gives a list of criteria that should be committed to memory by anyone attempting to write instructions about anything that has to do with computers.)
- *Games.* (Crichton thinks games are fine. They help familiarize us with technology. And computers "are the most compelling toy ever invented.")

Each of Crichton's meditations hammers home the message that the computer

> Calvinists so far haven't messed much with computers.

is a machine—different perhaps than any other machine ever invented, but still a machine.

At the back of the book there is an appendix for the Apple II and one for the IBM PC. These cohtain some start-up help to assist new users. There are also several elementary BASIC programs similar to those found in every other how-to-do-it computer book, and two whimsical longer programs (*Mystery Writer* and *I Ching*) that the author has written and that have been adapted to the Apple and IBM machines. —**A.S.E.**

The Complete Handbook of Personal Computer Communications
Alfred Glossbrenner
(St. Martin's Press, New York, 1983)
325 pages; $14.95

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BOOK REVIEW

databases and free computer bulletin boards, The *Handbook* tells you what's included in each service, how to sign up, how much it costs, and just about everything else you should know. There are chapters on teleconferencing, working at home, and electronic shopping or banking. For those interested in the technical aspects of data communications, there's a nuts and bolts chapter. For beginners, Glossbrenner explains how the PC works, and there's a glossary that covers everything from bits and bytes to bauds and modems.

But the book is probably best used as a guide to help you decide which services to buy. For example, if you play the stock market, The Source and CompuServe provide commodity news, historical information on stocks, market quotes, and news from business publications. The *Handbook* points out, however, that a serious investor should subscribe to Dow Jones News/Retrieval Service (DJNS), which includes estimates of corporate earnings for 2,400 companies, information from Securities and Exchange Commission files, and statistics on 3,200 individual companies, as well as economic analysis, commentary, and forecasts. This wealth of information is not only helpful, it can also save you money.

Glossbrenner finds that the online information and analysis is so extensive that based on it, sophisticated investors can make their own investment decisions and have a discount brokerage firm handle their trades. This saves investors money on every transaction and eliminates the need for an expensive, full-service brokerage house. Glossbrenner advises potential DJNS subscribers to make a small investment in a software package that accesses DJNS to obtain the specific information needed and automatically analyzes the data. The *Handbook* includes a list of such packages.

The Big Debate

If you want a service that provides everything from electronic mail to an

encyclopedic database, the *Handbook* helps you decide between The Source and CompuServe. There's a comparison of the costs and features of the two utilities. Glossbrenner admits to being a fan of CompuServe, in spite of several obstacles novices often face with it. He's quick to point out how beginners can get around the problems—for instance, how to get out of MicroNet, the programming part of CompuServe. Glossbrenner provides a list of additional documentation that may be helpful to users, and suggests that beginners on CompuServe and The Source will also find the online sessions, abbreviated "how-to" manuals, extremely useful.

Experienced users can save time and money with Glossbrenner's shortcuts, including a "secret" command (RCV) on The Source that lets you upload double-spaced text. This command saves you time, and, as Glossbrenner points out, when you're online, time is money.

Selling Encyclopedias

Saving time can also increase your productivity. Encyclopedic databases contain a vast array of information. Scientists, students, and business people should consider subscribing to one of the three encyclopedics Glossbrenner describes: DIALOG, BRS, and ORBIT. A sampling of the databases reveals various indexes, a career placement registry, an electronic yellow pages, and of course, encyclopedias.

Potential subscribers are reminded that encyclopedic databases are best used to get information on where to find information. The services generally provide only abstracts and not the full text of magazines or newspapers.

If the ability to do a complete search quickly isn't enough, and you need the full text of certain publications, the *Handbook* describes two alternatives, the New York Times Information Service (NYTIS) and NewsNet. NYTIS contains the complete text of the *New York Times* from 1980 to the present, plus abstracts of many other publications. For the inside scoop on your business competition, NewsNet contains the full text of 150 industry newsletters, many of which include daily updates.

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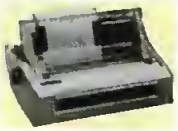

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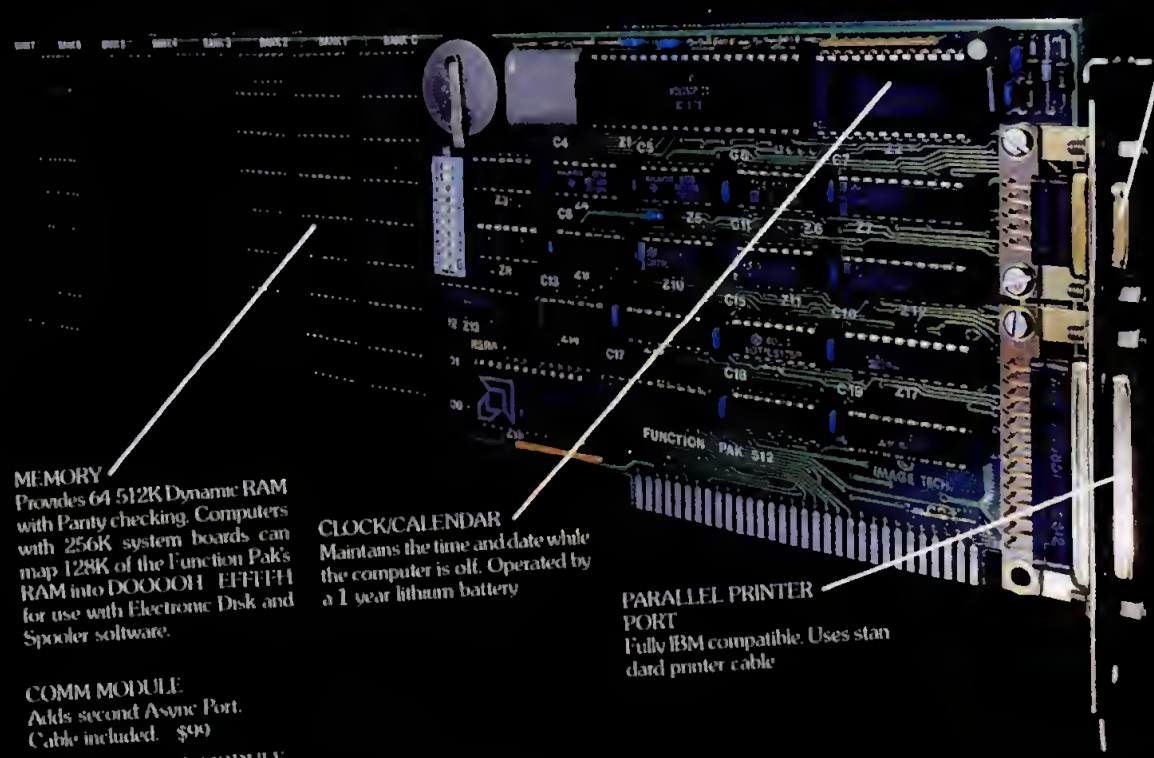

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Although you can use *Notebook* and *Bibliography* with most word processors and *Footnote* also works with *Select*, the program's author clearly had *WordStar* in mind. *Notebook's* built-in word processor, for instance, emulates *WordStar's* command language, so that moving from one program to the other does not require a cumbersome transition to another set of control codes.

Notebook: A Roomy Database

Notebook is a database management program designed specifically for the storage and analysis of written information. Other database programs can store text, but they often place severe restrictions on the amount of text you can store and the format in which you can store it. For instance, *dBase II* permits you to store only 1,000 characters per data record. *Notebook* permits you to store up to 32,000 characters in a single data record and up to 4,000 characters in a single data field.

When used with the PC's color adapter card and a color monitor, *Notebook* presents messages enhanced with distinctive colors. *Notebook* also contains its own formatting program; a menu-driven command module makes printing your databases a snap. The program is easy to use, a rare asset in the forbidding world of database software. All functions are driven by informative menus, and like *WordStar*, *Notebook* displays a list of the most frequently used commands while you're working.

Suppose your bibliography database was sorted alphabetically by author, but knowing that in your subject only the more recent sources would be useful, you wanted it sorted by date of publication. Had you recorded your bibliographic information not on three-by-five cards but on data records using *Notebook*, you could easily and rapidly (within about 30 seconds) reshuffle your database to suit your changing needs.

You can also use *Notebook* to set up a bibliography database. But its real value in the research process emerges when you use it to store, sort, and select research notes. Let's suppose your corporation asks you to research the investment climate in Mexico. After a quick visit to the library or a fast search using an on-line research database, you return to your office with photocopies of every relevant article published during the past 2 years in six major sources. You call up *Notebook* and design, following the program's easy menu-driven suggestions, a data record format containing fields for a topic title, a

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CIRCLE 386 ON READER SERVICE CARD

bibliographic reference, up to 4,000 characters of notes, a note on the type of material the record contains (for instance, "quotation," "definition," or "key point"), and the date of entry.

Once you've created the data record format, you can start taking notes. Let's say you begin with an article in the *Mexico City News* reporting a speech presented by a major Mexican government official on the role of the state in the economy. Your notes might look like Figure 1.

As you enter text, *Notebook* automatically expands the data record to fit what you've written. Notice, in Figure 1, that the reference field contains an abbreviated reference. This reference refers to a bibliography record you can create in another *Notebook*-constructed database.

A New View

Once you've finished reading, you can use *Notebook* to study your notes for maximum understanding of the material. Learning experts have long agreed that the best way to study is to divide your notes, sorting and restructuring them to produce illuminating patterns. To get started, you ask *Notebook* to select all records containing the phrase "key point" in the field "record type." It does so and shows you a new view of the database. You print it out, study it, and a major pattern begins to emerge: It seems clear that Mexico's government sincerely wishes to invite foreign investment, but its political position is such that it cannot risk liberalizing investment legislation that makes investment in Mexico a tricky process.

To get more insight into your material, you select more views, asking to see, for instance, all the records that mention "government official" in the field "notes" and "quotation" in the field "record type." *Notebook* rapidly shows you all records in which Mexican government officials are quoted. With several more such illuminating selections, you're ready to get started with your writing. To produce a writing guide, you ask *Notebook* to sort and print all the records alphabetized by topic. You also have handy several other printed sorts and selections, including one listing all the government officials' quotes that you'd like to use.

Footnote and Bibliography

As you write your report with *WordStar*, it's not necessary to concern yourself with the details of your references. Wherever you want a note to appear, simply enter an "at" sign (@) and insert the reference material in an abbreviated format (for instance, "%Castellanos, 1983, p. 1"). The @ symbol tells the *Footnote* program, which you'll run on the file once

```
Topic          :Role of the state in the Mexican economy
Reference      :Castellanos 1983, p. 1
Notes          :In a speech to foreign investors in Mexico
               :City, a key government official,
               :Assistant Finance Secretary Francisco Suarez
               :Davila said that Mexico needed foreign
               :resources "provided they adhere to existing
               :legislation." He said that "there is no
               :roorn for argument on the role of the state
               :in the fight for economic recovery," and
               :that "the state is in charge of conducting
               :and orienting the development process."
Record Type    :key point, quotation
Date Entered   :11/21/83
```

Figure 1: *A completed* Notebook *data record with five fields designated and information filled in.*

you're finished writing, to insert a footnote at that spot and to number it automatically. The percent symbol tells the *Bibliography* program to look up that reference in the bibliography database, to insert the full text of the citation instead of the abbreviated reference, and to include the full text of the citation in an alphabetized bibliography. You simply run these programs on your text file and within minutes you've got a formatted paper with footnotes at the bottom of the pages and an alphabetized bibliography at the end of the text. If you've ever suffered through typing up a paper with footnotes, all this probably sounds too good to be true.

To finish your paper, you first run *Bibliography*. When it's finished, your report has been altered; in place of the abbreviated references (like "Castellanos, 1983, p. 1") you'll find the full citation, which *Bibliography* has cunningly extracted from the *Notebook* bibliography database you constructed. It has also created an alphabetized bibliography of all the bibliographic items you cited in your text. To produce a finished paper, you need only run *Footnote*, which automatically numbers your footnotes and places them at the bottom of your report's pages. If you need to insert or delete text, you repeat the whole process as necessary until your paper is finished. Instead of 3 days and six trips to the typist, this documentation process takes about 10 minutes.

Of course, the programs are not flawless. *Notebook*, for instance, runs slowly; scrolling through a large database without the aid of a hard disk is a slow and tedious job. But if you're already working with *WordStar*, you will doubtless have concluded that more RAM and the software to transform it into a pseudo-disk are more than luxuries. And *Footnote* cannot distinguish between first and second citations of the same work, mandating some manual rewriting of the notes.

These are small quibbles about some fine software. All three programs are remarkably free from obvious bugs. They do what they claim to do. ■

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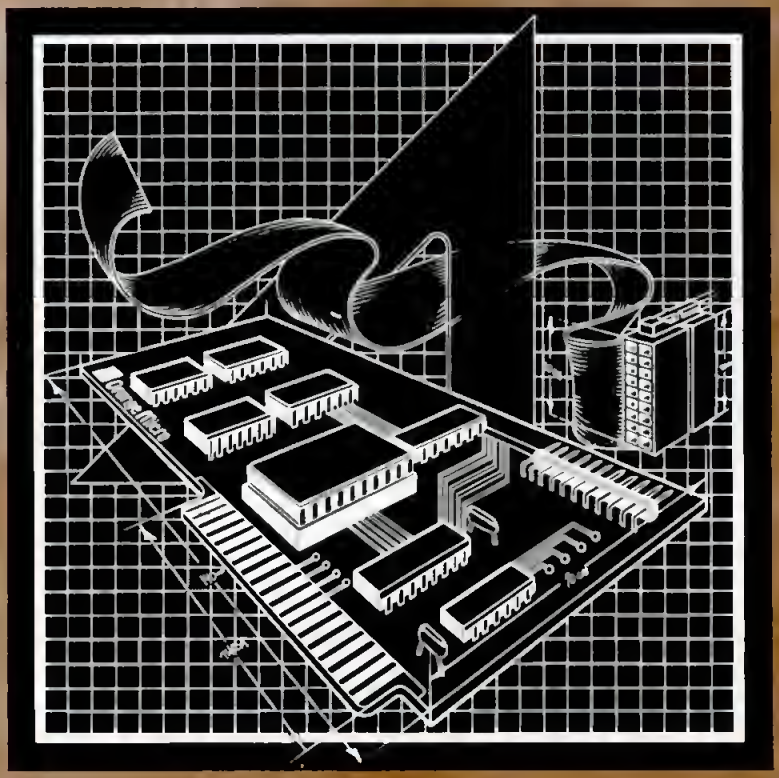

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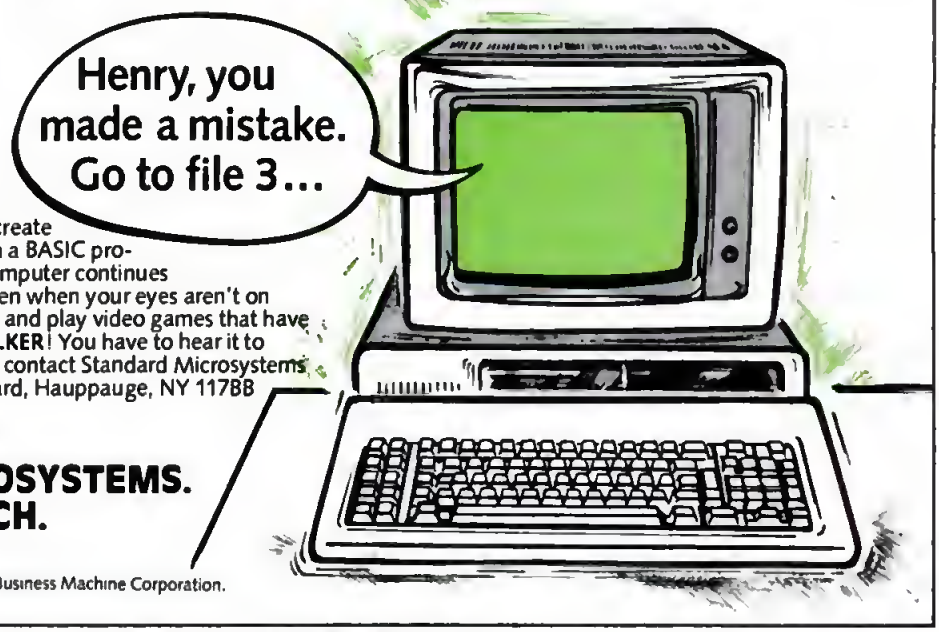

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CIRCLE 278 ON READER SERVICE CARD

Engineering Software Exchange

A home-grown newsletter published by a husband-and-wife team is designed to help engineers sort through software and gain confidence in computers.

Engineering professionals have a special demand that they place on personal computer software: They need to know that the bridge they design with it won't fall down. But, their first, more immediate, demand is for PC software with engineering applications.

That need is the rationale for a new newsletter, *Engineering Software Exchange (ESE)*, put out by Charles and Lidia LoPinto, a young husband-and-wife engineering team in Yonkers, New York. The heart of each issue of *ESE* consists of reviews of newly available software. The LoPintos say that it is next to impossible for them to include critical reviews of the quality of programs and simultaneously to publish the newsletter. For one thing, there just isn't enough time. But the main reason is that although both LoPinto's are very knowledgeable about their field, chemical engineering, they don't have the expertise to cover all engineering disciplines in great depth. Their reviews therefore consist of a paragraph- or column-long description of a program, its documentation, and the standard price, computer compatibility, and source-code criteria.

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Charles and Lidia LoPinto, the entrepreneurial team behind the *Engineering Software Exchange*.

The newsletter thus serves as a clearinghouse rather than as a critical journal. "We get submissions of everything from checkbook-balancing programs to heavy-duty structural analyses," says Lidia. "We use our judgment in what we write up, but it's impossible for us to give an in-depth analysis of each program."

Charles elaborates: "One of the problems holding up a lot of engineering software development is the issue of reliability. It's one thing to have a program that puts up a spreadsheet, but it's another thing entirely to design a bridge based on a program—how do you know the bridge won't fall down? You can put all the bells and whistles you like on a program to warn the user about exceeding its limits, but you still have a problem in certifying its output." The liability is obviously enormous: the general word in the engineering community is that one can trust only the programs one has written oneself—and maybe not even then. Even so, as the experience curve rises with engineering users of PCs, and as more tested mainframe programs get downloaded onto micros, engineers will begin to gain confidence in computers. During the sixties the same concerns were voiced about mainframe programs applied to engineering problems, but those programs are the industry standard now.

A sample of some of the programs reviewed recently in *ESE* shows the diversity of programs being developed: stress analysis for static components like beams, plates, flanges; process simulation of chemical reactions; heat transfer analysis in heating/cooling equipment; combustion efficiency of boilers; sizing pipes and valves for fluid flow; running process control systems; maintenance programs for plotting machinery's operating history and for scheduling repair; and laboratory functions such as spectrum analysis and process control.

The newsletter was born when Lidia, a process engineer who had become in-

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CIRCLE 378 ON READER SERVICE CARD

volved with computers, left her job at a chemical company. She planned to start her own consulting firm for computer educations in engineering. "Between consulting jobs I had a lot of free time, and I had already been looking for some way to get deeper into my specialty, computer applications for engineering. I wrote a number of articles for the trade press and then began to set up an exchange for software for any system from a TRS-80 up." The queries began flooding in, and she started offering her list for a dollar. Before long, the nature of the queries coming in and the types of software being offered propelled her into the personal computer field,

> Our first self-printed issues were pretty awful, but our readers were very forgiving.

where she reviewed not only individually written programs, but also programs from new companies being set up specifically to satisfy engineering needs. "Some news still travels slowly in our presumed electronic society—I'm still getting requests for that original $1 list!" she exclaims. "I'll send out a copy of our latest newsletter, but the dollar doesn't even cover the mailing cost anymore."

As the newsletter grew, Charles began pitching in. He's a chemical engineer at an oil company (both LoPinto's have Masters degrees in chemical engineering). "Fifty percent of my time at work is spent in computer applications for process design," he says.

A milestone for the newsletter was the purchase of a used, hand-operated offset printing machine. Printing costs had grown unmanageable, and having a printing machine allows the LoPintos to produce advertising circulars for *ESE* as well as to publish the newsletter. "Our first self-printed issues were pretty aw-

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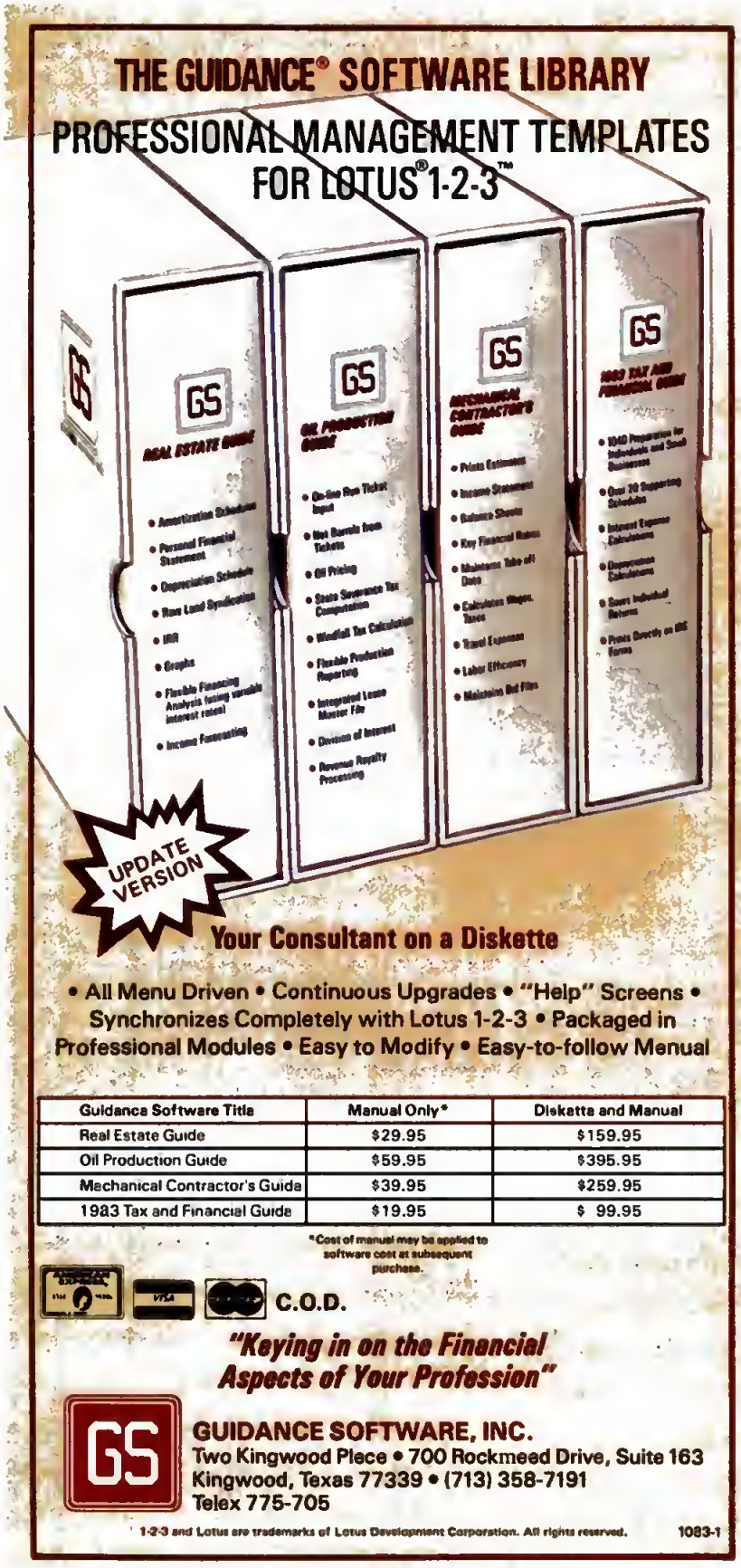

CIRCLE 231 ON READER SERVICE CARD

ful," Lidia admits, "but our readers were very forgiving." Now, however, the newsletter sports a polished, professional look. Charles handles the printer and writes some of the reviews, while Lidia does the mailing and most of the writing. A couple of part-time workers help out.

Though *ESE* was not much more than a few sheets of mimeographed paper when it began about a year ago, today the newsletter is beginning to take over the LoPintos' home—they have two rooms of computer equipment in the attic and a printing press in the basement. As each new issue goes to press, "paper starts covering the house and furniture," according to Lidia. Each issue, which currently runs about 24 pages, is a homey mix of news of interest to engineers, CAD/CAM developments, reviews of newly available software packages, and a section reserved for individual subscribers to list their own software—generally small packages that run from $10 to $150. The newsletter is published every other month; an annual subscription costs $48.

To conclude their first full year of successful operation, the LoPintos plan to publish a directory of all the software they have already publicized. "This directory will probably have over 350 entries covering micro and mini software in chemical, electrical, civil and mechanical engineering, laboratory applications, and more," says Charles.

Meeting a Need

In their compiling efforts, the LoPintos seem to be satisfying a widely felt need in the engineering community; a number of engineering societies are already trying to compile directories of available software. But the LoPintos have moved much faster, and they are seeking to build a base of subscribers and software suppliers that cuts across the divisions among the engineering professions. "Although it sometimes seems that every engineer out there is writing a program, there is a tremendous shortage of useful software," notes Lidia. "The number of engineers writing soft-

ware is not growing as fast as the number of engineers buying PCs. Based on requests from readers, we've also started running a section of 'software wanted' items."

The IBM PC didn't create the LoPintos' newsletter, but Big Blue seems to be helping things along now. "Like every other microcomputer application, engineering programs are being sped along by the standardization caused by the popularity of the IBM PC," observes Charles. "Standardization also makes our review job easier."

Adds Lidia: "More than once, we've heard about a company considering a big computer purchase, with the purchasing manager saying, 'You can study this situation as long as you want, but we'll end up buying IBM.' "

The LoPintos have observed that some of the latest industry trends are developing because of the PC. "We're seeing a lot of programs being downloaded from mainframe IBM's that are applicable to the PC," says Charles. They also expect the newest PC models—for example, the XT/370—to open up new possibilities in networking stations. For design firms in which a crew of engineers may work together on one project, this is an important capability.

Although it started in a small way, *ESE* is now a going business for the LoPintos. "We haven't made any money on this yet," says Lidia. "Everything we've got from subscribers is being poured back into the business." Advertising and direct mail now represent the largest financial investment for the couple. And like traditional newsletter developers, the LoPintos have found that their biggest problem in publishing the newsletter is attracting the potential subscribers they know are out there. "In a formal marketing sense, we're probably a little screwed up—we have no idea what the 'top' is for this newsletter—that is, how many potential subscribers there are out there," notes Charles. "But the letters are still coming in every day." ■

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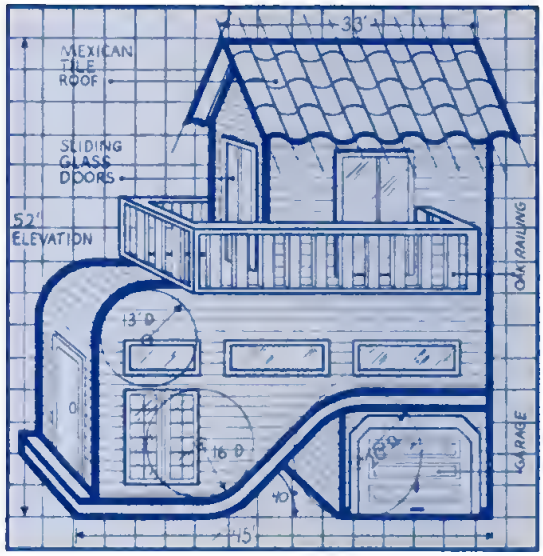

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The Starter 100 package is the $95 minimal version "for people who want to learn something about drafting," as the promotional material puts it. The most advanced version is the Pro 300, which is geared for the most professional user. In between are three more versions: Academic 100, Pro 100, and Pro 200. Only two, the Pro 100 and Pro 300, are currently available; the other versions are in various stages of testing. When the complete family of five is on the market, the programs will address every level of drafting interest and expertise.

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Requires: 256K RAM, one disk drive, color interface, color monitor, dot matrix printer or plotter.

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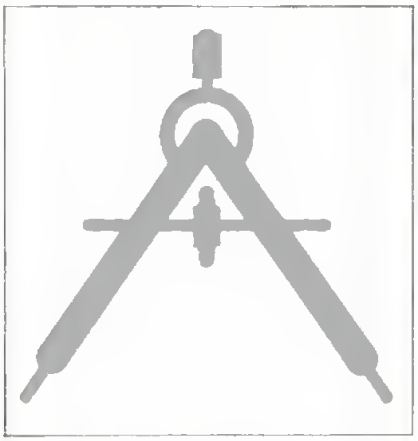


The basic drafting system is fairly simple to use. To draw a line, first place the cross hair cursor at the beginning point and hit a key designated LINE on the *Draft-Aide* chart. Then put the cursor where the line is to end and hit the LINE key again. A line, in one of three line widths, chosen by the user, is drawn between the two points.

To move the cursor you can use the keyboard, a joystick, or a mouse. To draw an arc, you can either specify three points and ask for an arc to be drawn through all three, or you can specify a center, radius, and extent.

One feature of *Draft-Aide* can save you a great deal of time and energy. Once you've drawn an image, whether it is a Bunsen burner or a voltmeter or whatever, you can store it, later call it up, make it larger or smaller, place it anywhere on the screen, or repeat it as many times as you wish. An image of an intricate transistor or an integrated circuit can be stored and then called up dozens of times for different drawings. The more advanced *Draft-Aide* packages, starting with the Academic 100, allow figures to be rotated and mirror-imaged. When many figures are to be stored for later call out, United Networking Systems recommends using a PC-XT, with its hard disk and much higher storage capability, instead of the regular PC.

With *Draft-Aide*, the PC's screen can display your entire drawing greatly reduced in size, or it can zoom in to give you a 1:1 size when you need to draw or change the original. The maximum size for a drawing is 36 by 42 inches.

Draft-Aide also provides a full set of letters and numbers for labelling your drawings. Although there's only one font, you can make the characters as big or as small as you wish. When it's time to print, you can use a pen plotter or a dot matrix printer. Of course, to print a full-size 36-by-42-inch drawing you'd need a rather larger plotter.

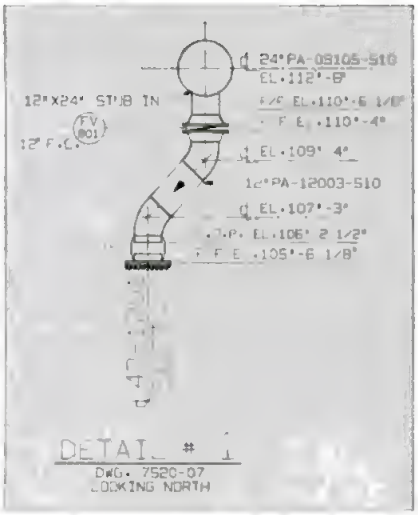
All in the Family

The Starter 100 is "an interest-generator, well-suited to high school students," according to Thomas F. Safford, whose

Houston-based Safford Systems Inc. developed *Draft-Aide*. The firm later merged with United Networking Systems Inc.

Draft-Aide could be used in a high school setting by students in chemistry, physics, drafting, or any course involving drawing.

An IBM PC in the school library, along with a Starter 100 package, for instance, would not only save drawing time, it could also encourage more extensive use of drafting. The package can serve as an introduction to the commercial world of computer-aided drafting and might even encourage some students to explore technical careers they hadn't previously considered.



A detail from a piping diagram generated by *Draft-Aide*. Other common uses for the software would be to generate architectural or electronic drawings.

The next step up is the $195 Academic 100 package, designed for use by universities, colleges, and trade, technical, and company-sponsored schools. It can be used by novices as well as advanced students. The University of Phoenix is considering installing this package for student use and is negotiating with United Networking.

In the middle of the *Draft-Aide* line is the $595 Pro 100, which "allows users with limited drafting requirements to get into computer-aided design quickly." The Pro 100 might, for example, be used by computer camps or architectural firms that have small computers.

Customers for the Pro 100 have been "both company and independent architects and design engineers, moderate-size engineering and architectural firms, and many levels of technical personnel at the

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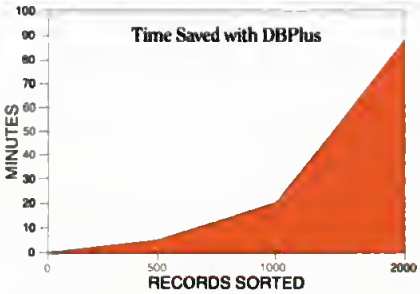

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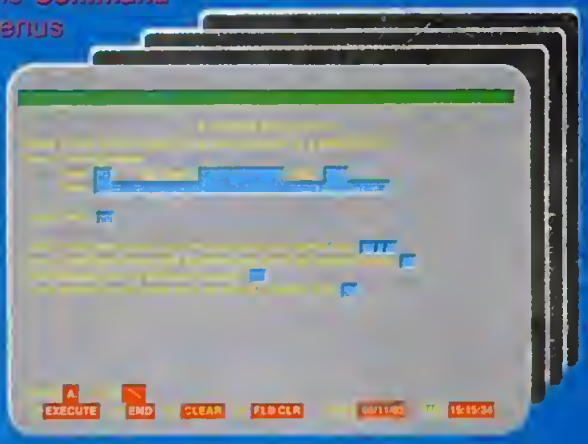

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larger firms specializing in those disciplines," according to United Networking Systems.

The $7,500 Draft-Aide Pro 200 package is a full-power drafting software package aimed at large engineering companies.

At the top of the line is the Pro 300 for sophisticated users or entrepreneurs who want to operate their own drafting service centers. This package is also aimed at large industrial users such as aviation and aerospace manufacturers. The basic version of the Pro 300, priced at $25,000, includes just the software. For a $75,000 investment, you can also get the computer, a plotter, and a graphics terminal.

The larger versions of *Draft-Aide* use 110 subroutines in Fortran, combined with four external files: two scratch files, one symbol file, and a drawing file. The symbol file can hold up to 500 active symbols created by the user, and it may be accessed by name.

Fancy Packaging

The *Draft-Aide* software is neatly packaged in a container designed by the New York advertising firm of Ogilvy and Mather. The basic package includes a floppy disk and operations guide, the larger versions will also offer a glass *Draft-Aide* drinking mug and a T-shirt showing a T-square being passed from one hand to another and bearing the legend "I Get Drafted Fast."

United Networking will spend $3 million on marketing and manufacturing *Draft-Aide*, and it plans to adapt it to other personal computers.

The company plans to distribute the smaller *Draft-Aide* systems through computer stores and bookstores; they can also be ordered by mail. Versions of *Draft-Aide* that can operate on IBM PC systems with less than 256K RAM may be available in the future.

Currently, optional symbol libraries are available on floppy disk for architectural, electrical, electronic, and piping drawings. They cost $75 each. Symbol libraries for other disciplines will be available in the future. Special fonts for lettering drawings are available on special order.

United Networking has a "900" customer service number, (there is a 50 cent charge for calls) and plans a newsletter to keep *Draft-Aide* users abreast of all new developments and new products. ■

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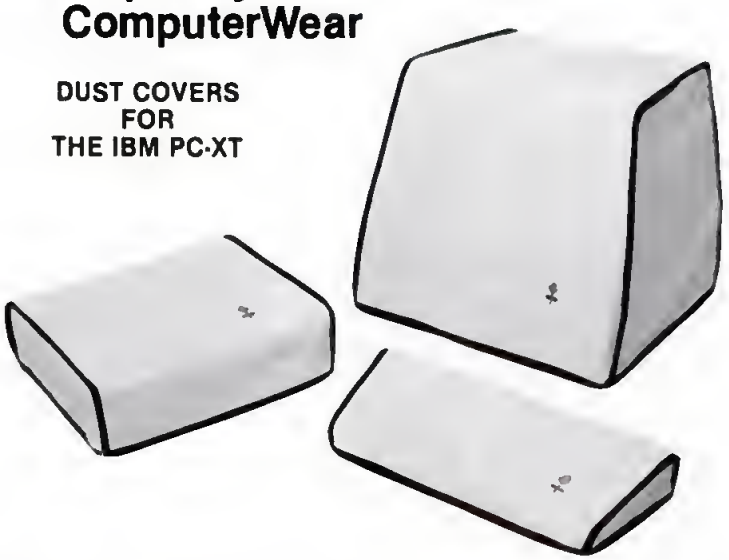

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The Doctor's Experience

Keeping track of patient files can take many hours and still leave gaps. One physician explains the value of computerizing patient records in a database called an E-Book.

In the last week of our 3-year residency in family practice, my partner told me this tale of woe. "I just spent half a day going through the records in the delivery room and making a list of all the babies I had delivered." I groaned because I knew what those records looked like—page after page of one-line descriptions of deliveries, usually scrawled by doctors in the middle of night after many long hours of waiting. "Fortunately," he said, "I found all of mine—I think."

I confess that I felt smug while I listened to his woes. Two years ago I had acquired one of the first IBM PCs in Missouri. Since then I have used it to document every single experience I have had with patients.

There are many reasons for physicians to keep track of their experiences caring for patients. One is to document your experience is to prepare for outside review. Requests to prove one's capabilities are required for hospital privileges in many localities, especially for such high-risk procedures as obstetrics, surgery, and invasive tests (for example, cardiac catheterizations). Several speciality boards, including family practice and emergency medicine, require that doctors be recertified every few years. A review of cases is part of the recertification process.

Systems are available for recording this information. Residencies may provide special cards to their residents to use for records. Doctors are probably familiar with several methods of organizing this information in a notebook. But with these manual systems, there's the problem of retrieving the information quickly in a useful format.

Hospital and medical office computer systems may collect this information, but the design of these systems is biased toward business uses, so the clinical information is usually scanty and imprecise. Furthermore, with an institutional system, the physician has no control over information for his own use. Hence, the personal computer is a good tool for a doctor's recordkeeping, since it can be adapted to individual needs and can greatly speed and simplify the task of keeping and using accurate information.

The E-Book

What kind of information might a physician need to record? This would vary for each specialty but would usually include the patient's name, an identification number, age, sex, race, when he or she was seen, and the resulting diagnoses and procedures. This set of information is collected in what is called an encounter log or an "E-Book."

The E-Book is an example of a database—a set of data organized in a useful way—and there are many ways to implement it on a computer system. When I was a resident, I wrote a BASIC program to handle the information in the way that I wished. This was my first experience with programming the PC.

However, writing such a program can be time-consuming and requires a great deal of attention to detail, so I don't recommend that all doctors do this. Starting from scratch to solve a problem is a common, expensive mistake made by many new computer users. There are now many software packages available (such as *dBase II*, *EasyFiler*, *PC-File*, and integrated programs that combine spreadsheets, word processors, and database functions) that can take a lot of the drudg-

ery out of writing a database program.

Designing the Database

Before designing the format for a database, think about how the information will be retrieved and used. This will determine what information should be saved and the form in which it should be organized. You want to get back lists and counts of the procedures, diagnoses, types of patients we have seen, and the places where they were seen. You also want to be able to define subsets of these lists—for example, the diagnoses of patients seen at a certain hospital during a certain time period.

Remember that the most difficult aspect of using a database is entering the information in the computer files. For efficiency, you want to record only the data necessary for the intended use. Furthermore, the information must be entered in a way that will insure accuracy. Using a program that will screen entries to the database is one means toward this end.

Another useful device is a coding system that provides a shorthand way of identifying items in a given field. Common examples are using "M" for male and "F" for female in the field for sex, or using the numbers 1 through 12 to stand for the months of the year. These codes save considerable amounts of space in the computer records and allow for easy retrieval.

I have already listed some of the fields that would be included in the record of each session with a patient, such as the patient's name, the date, demographic information, and the diagnoses. Now I'll consider some of the field items in detail.

In the fields used to identify the patient, a problem arises because many people have the same name. Therefore, it is a good idea to provide another identification field using some sort of ID number, called a unit or patient number. This may be assigned when the patient first visits an institution for care, or it may simply be the patient's social security number. If the E-Book database will be used to prepare case histories for your certification, the patient number can be used to list all your contacts with that patient over time.

Recording a patient's birthdate is more useful than recording the age, since the birthdate helps to consistently identify an individual patient; you can always calculate age from the birthdate.

The next piece of information is when the patient was seen. For a patient seen in a clinic, one field for the date of the visit is all that is needed, but for a hospital patient, you should record the date of admission and the date of discharge, as well. By recording these dates, you can later produce a list of all the patients seen during a period of time or determine the average length of stay for your hospital patients.

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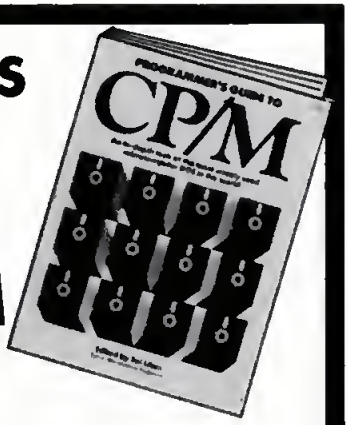

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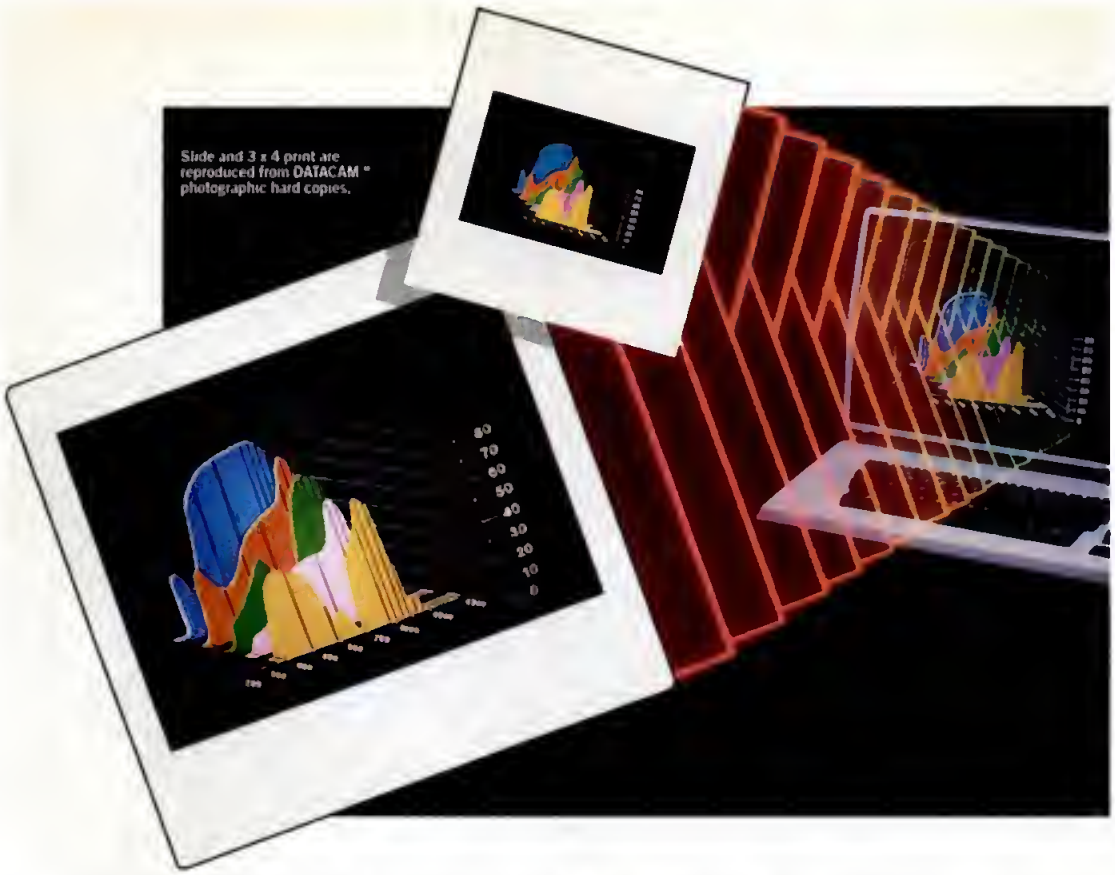

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where each patient was seen. For example, a private practitioner would want to know whether the patient was seen in the office, in one of the hospitals to which the practitioner admits patients, in an emergency room, or at the patient's home. A resident in training who spends time working on several different services or specialties would want to record which specialty was involved.

The lists of diagnoses and the procedures that were performed while taking care of the patient are the most important information in the E-Book. The list of diagnoses is most useful for you to review your experiences. It does not need to be an all-inclusive list of every problem each patient has. Instead, the list can be more selective, focusing on those cases that were your significant patient care experiences. A specialist would record only those problems unique to the specialty and the generalist would record only the problems actually dealt with during that visit with the patient. In general, five fields in the record for recording diagnoses should be ample space for describing any patient encounter.

A wide selection of standardized and uniform coding systems for diagnoses have been published and are available in medical libraries. In the field of primary care, the most commonly used systems are the International Classification of Health Problems in Primary Care (ICHPPC) and the International Classification of Diseases—Amended (ICDA). Most specialties have established lists with more precise diagnoses categories in their subject area. You might find it best to develop your own list and perhaps refer to one of the standard systems as an outline.

Code numbers save time and space that would be used to type out the entire text of each diagnosis. They also result in standard names, which allow easy and complete retrieval.

The procedures you perform can be recorded in the same manner as the diagnoses. A coding system is helpful here as well. One standard coding system is called the Common Procedural Terminology (CPT), but a self-made list might be handier since this standard list is quite long. Fields for three procedures in each record should be sufficient.

Another field that you will probably want is one for comments. There are often, some interesting features about a given case that aren't common enough to have been included in the codes for diagnoses and procedures. Since these remarks can be succinct, this field would not have to be longer than 40 or 50 characters.

A physician who keeps a list of his patient care experiences on a microcomputer has a simple but potentially valuable database. In a future issue of *PC Magazine*, I will explain how you can use *PC-File*, an inexpensive database program, to implement a physician's E-Book. ■

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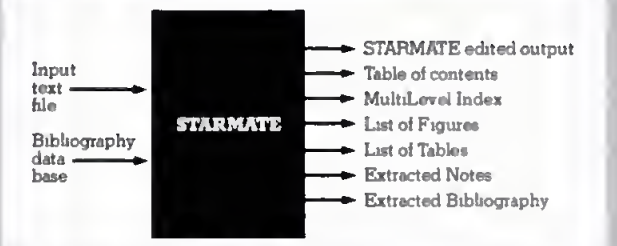

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Maxi-Value From A Mini-Ledger

An efficient accounting program rides to the rescue of small businesses. It helps them in tracking and organizing expenses and saves the cost of a general-ledger program.

For owners of small businesses who would like to do bookkeeping on their microcomputers, there has traditionally been only one option—buying a large general-ledger program. But, for the small business, this option can be expensive. The large general-ledger programs often require a great deal of expensive hardware, particularly hard disks, which many small offices may not have.

To the rescue comes a program called *Mini-Ledger* (Version 1.8) from Paradigm Consultants, Inc., in Fremont, California. *Mini-Ledger*, as emphasized in the program manual, has no pretensions to being a full general-ledger program. It's designed to do two things:

- Organize your records in a format that will expedite your accountant's job.
- Track your expenses and income on a continuing basis to enable you to make intelligent decisions about your business.

Mini-Ledger initially presents you with a menu of over 30 different monitors from which to choose. If yours appears on the menu, a single keystroke, in most cases, will set up the program for your computer. Printer setup is similar.

Once the program has been set up, it is easy to use because it's straightforward and menu-oriented. The first step is to enter expenses and income. After each entry, the cursor moves automatically to the next position. Editing entries is accomplished with either control characters or the arrow keys.

Chart of Accounts

When you are finished with the demonstration files and ready to begin setting up your chart of accounts, you may do so using a separate item on the program's main menu, or you can build the chart of accounts as you enter data.

You are allowed a total combination of 99 accounts and subaccounts. For example, if the number 1234 is an office supplies account, you can write subcodes such as 01-1234 to indicate a particular vendor with whom you do a lot of business. Your accountant need only be concerned that you have charged a certain sum to account 1234 because *Mini-Ledger* will total up expenditures by account number upon request. However, you can get data that will break out all information by subcodes, as well as by accounts.

You will most likely want to create a basic chart of accounts in consultation with your accountant. Once you've done so, adding such things as subcodes can quickly be done from the main input routines. You are not obliged to exit to another routine to add one item, which is one of the most appealing aspects of this program. Typically, the most tedious task associated with computing is inputting data. *Mini-Ledger*'s input screen is so thoughtful that working with the program is a pleasure. The next step after indicating that you wish to enter expense and income information is to assign the first file name for the system. You are allowed a total of 50 files in 1 year; for instance, you could create four files in the month of January, four in the month of February, and so on, with two left over.

The next step is to key in the date, which is automatically formatted for you, and then indicate one of four transaction types by pressing D(eposit), P(ayment), V(oid), and C(redit), respectively.

Checking Your Checks

The cursor then automatically moves to the check number column. If you are working with sequentially numbered checks, and you press the Return key, the program will automatically increment the check number by one. If you enter a check number that is out of sequence with the

Mini-Ledger (version 1.8)
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39243 Liberty Street
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Requires: 64K RAM, 132-column printer recommended.

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one that immediately precedes it, the program will bring this to your attention but will not force you to back up—a clever device to keep you from losing track.

The program calls for a description of the transaction up to 20 characters long, followed by the subcode and a main code. When you enter the codes, the name of the account appears at the top of the screen as a verification of your entry. If you enter a code–subcode combination that is not on the chart of accounts, the program will ask if you want to use the code anyway. If you do, it then asks you if you wish to place it in the chart of accounts. Normally, you will answer yes, in which case the program asks you for a 35-character description of the item for the chart. Once you've taken care of this housekeeping, you make your final entry, a dollar figure. Incidentally, pressing the Tab key will duplicate items entered on the line immediately above, which saves typing of repeated entries.

At any time you can move the cursor up and down on the screen. The screen will automatically reformat itself for you. You can backtrack and insert an entry that you might have overlooked, while the program continuously updates your running halance, shown on the right edge of the screen.

Output

Mini-Ledger provides data for both the business executive and the accountant. It offers a running report of the entries as they were entered on the screen—unsorted and in the original order. It can print from the first file in the system to the last or pick any group of files in between. Fiscal year users can go "backwards," starting with October and ending in April. In addition, an elegant sort-and-accumulate routine lets you pick any group of files that you wish, sort them chronologically, total all the codes and/or subcodes (if you wish), and print them out as a report.

Incidentally, all the printouts that *Mini-Ledger* generates can be transferred to a disk file where they can he read hy any word processor capahle of reading a simple ASCII file. This permits a user to read the files and lift out information for letters or financial reports he is composing.

In addition, the program will furnish an alphahetized or numerically sorted chart of accounts and will accumulate the totals for the chart of accounts for any period of time

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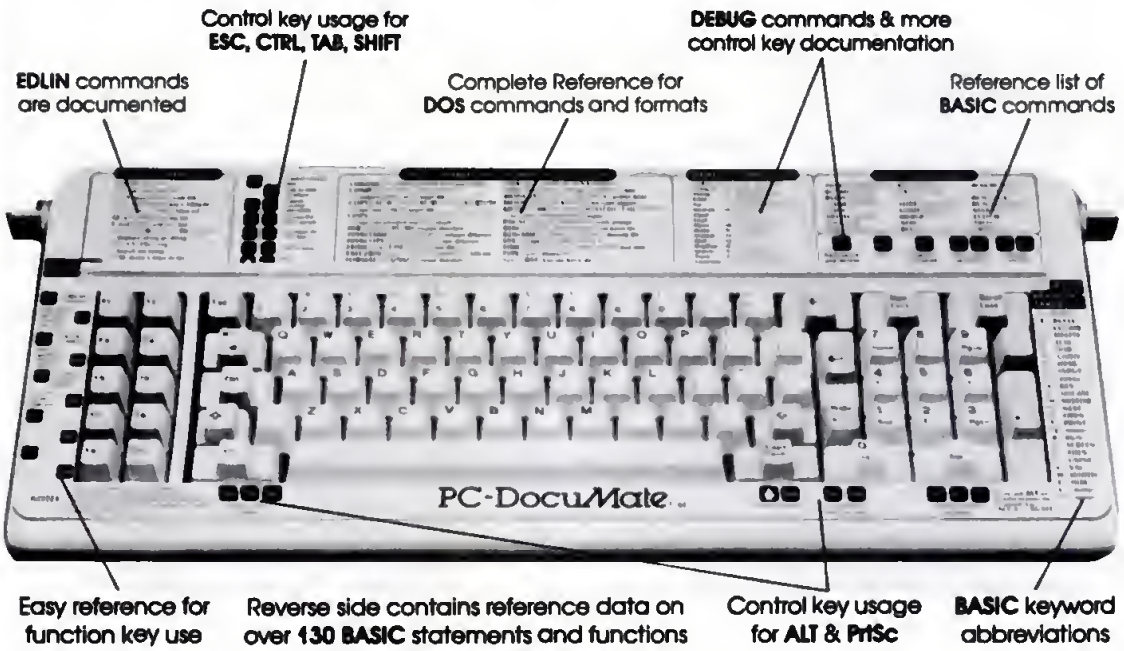

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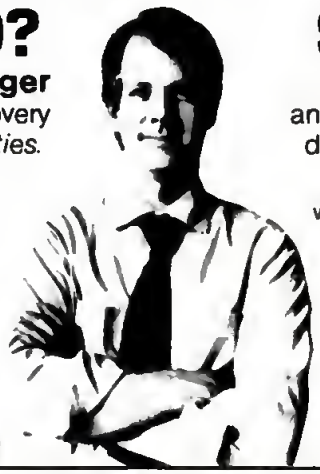

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you specify. In other words, you can print a quarterly report that will total all items by chart-of-account numbers or by the subcode numbers. This option is valuable for the accountant, who may be using his own computer at this point and may need some control figures in order to make comparisons with his office computer.

Mini-Ledger also generates a year-to-date report in matrix form of all codes and provides the dollar figures associated with them.

Error Handling

Mini-Ledger has excellent error-catching capabilities. I was unable to make an entry that fouled up the system. The program rejects invalid dates such as 12/32/84. If you try to give it a transaction code other than the four it will accept, it gives you an error message explaining what it requires. If you have a habit of typing the letter *l* instead of the number 1, it will beep at you.

After several warnings, the program will let you put in an account number that is not on the chart of accounts, but the dollar amount will be assigned to UNCODED on the printouts at a later time. The entry will be shown to you separately on the printout and, in case it was a mistake, you can go back and correct it.

Mini-Ledger does not have the ability to instruct the computer to write the checks, but I didn't find this feature particularly useful. My experience as a consultant has taught me that once the novelty of having the computer write the checks has worn off, most small businesses go back to writing them by hand. If the business is large enough to justify the complications of computer-generated checks, it is probably too large to use *Mini-Ledger*.

Another feature this program lacks is the ability to generate true profit-and-loss and financial statements. The printouts it generates are adequate enough to give you an excellent overview of your financial operation. And, if you want more complex statements, you will have to go to your accountant anyway.

Nonetheless, *Mini-Ledger* is a fine program. It is easy to use, and its input method makes it nearly impossible for the program to choke on data. And giving the user the option of adding new chart-of-account codes on the fly is a particularly practical feature. *Mini-Ledger*'s authors must have watched people work. ■

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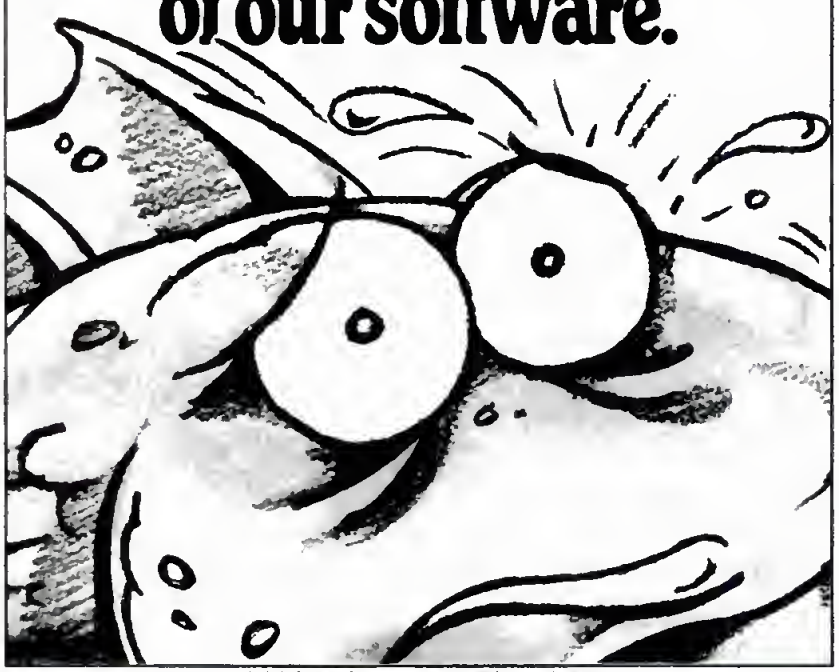

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CIRCLE 792 ON READER SERVICE CARD

DVORAK Keyboard, KeyTronic Corp.

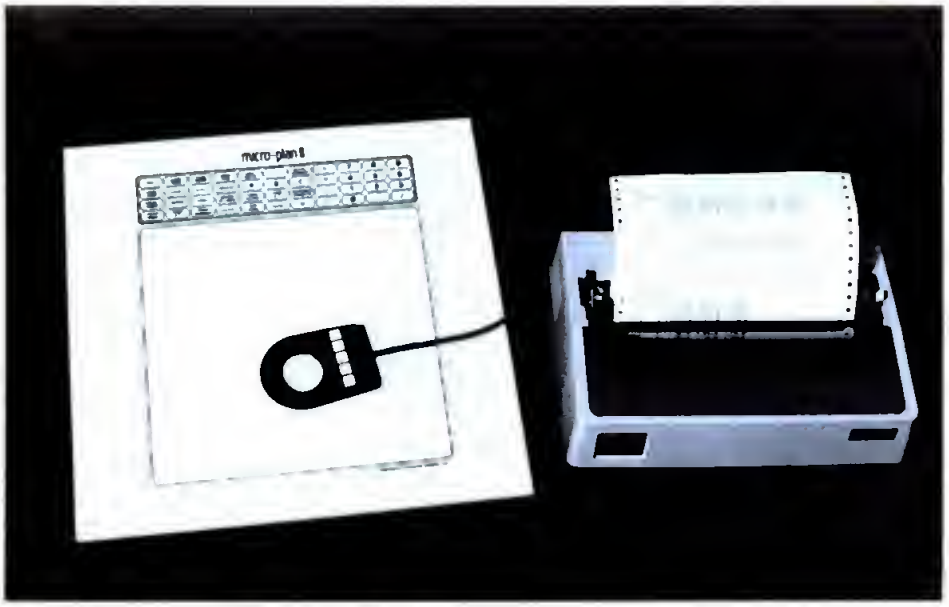
Hard Disk Drives

A line of 5¼-inch hard disk drives available in either master or slave drive configurations. The units are provided with all needed hardware and software, including a disk controller board that plugs into a slot within a user's system, and software allowing the user to define the volumes that suit a particular application when formatting the drive initially.

The hard disks are offered with seven different memory storage capacities, ranging from six megabytes to 140 megabytes. Also available from the manufacturer is a ¼-inch streaming tape backup drive that plugs directly into the hard disk drive, instead of into the user's system.

(List Price: $2,395-$9,995, depending upon storage capacity; Streaming Tape Backup $2,395)
Pacific Datanet
1 Almaden Blvd., #300
San Jose, CA 95113
(408) 972-9163

CIRCLE 791 ON READER SERVICE CARD



Micro Plan II, Laboratory Computer Systems, Inc.

Micro Plan II Image Analysis System

An image analyzer/digital planimeter, consisting of a tablet with an 11 × 11 inch active tracing area with a separate menu area for controlling tracing modes, measurements, and printed results. The on-board microprocessor can calculate length, area, and other morphometric measurements from data which is traced on the digitizing tablet. Individual and summed sets of measured values are printed on the alphanumeric printer included in the system, along with statistical data such as means and standard deviations.

The image analysis system has two serial RS-232 ports, allowing data to be transferred to other computers, modems or other serial devices for data storage and later analysis. Results from tracings are printed in millimeters or user-defined units based on tablet resolution of 10 lines per millimeter. Tracing modes and scaling factors are entered using the menu area on the tablet.

The Micro Plan II Image Analysis System includes the tablet with two RS-232 ports, a pen or five-button cursor, an enclosed power supply, and an 80-column dot matrix printer.
(List Price: $4,500)
Laboratory Computer Systems, Inc.
139 Main St.
Cambridge, MA 02142
(617) 547-4738

CIRCLE 790 ON READER SERVICE CARD

Compu-Music CMU-800R

A multi-voice synthesizer and software-based music programming system. The Compu-Music CMU-800R hardware can create piano, bass, and drum sounds. It connects to the user's system via a plug-in interface card that uses one slot. The unit then connects to any amplifier or stereo system for audio performance. The device consists of a six-voice music synthesizer, a seven-voice drum synthesizer, a clock for controlling tempo, a mixer for combining different sounds, eight outputs for connecting external synthesizers, and audio outputs for monitoring sound.

The software provided with the unit allows the user to enter, arrange, and play music through the CMU-800R, and to store and retrieve music on diskettes, using keyboard commands.
(List Price: $495; Software and interface card $70)
Roland DG
7200 Dominion Cir.
Los Angeles, CA 90040
(213) 685-5141

CIRCLE 788 ON READER SERVICE CARD

Bytewriter

A daisy wheel printer/typewriter with parallel interface. The unit is based upon the Olivetti Praxis 30 typewriter, and can produce letter-quality printouts at 8-12 characters per second. The Bytewriter also features software-selectable pitches of 10, 12, or 15 characters per inch. Disconnected from a user's system, the Bytewriter becomes a stand-alone typewriter.

The interface is available in kit form, and can be used with Praxis 35 and 40 typewriters as well as the 30. It fits entirely within the typewriter, and provides a Centronics-type parallel port.
(List Price: Bytewriter $495; Interface kit alone $165)
Bytewriter
125 Northview Rd.
Ithaca, NY 14850
(607) 272-1132

CIRCLE 762 ON READER SERVICE CARD

PC PROBE

A hardware/software package providing programmers with a debugging tool for software development. The device consists of a printed circuit card that fits into a slot in the user's system; a cable and probe that fits into the 8088 IC socket; and debugging software on diskette. PC PROBE software, including symbol and macro command tables, is contained on 64K of on-board RAM that is protected against alterations by software under development.

The PROBE has 24 types of real-time breakpoints that can implement eight breakpoints at a time. Once a breakpoint has been reached, the device can execute a real-time trace of the previous 1024 instructions, eliminating slow step-and-display sequences. In addition, the trace feature allows up to eight channels of external information to be traced as a typical logical analyzer function.

Symbolic debugging capabilities allows a programmer to use symbols rather than absolute values in all program commands. To try out program changes before reediting and recompiling, program patching can be inserted into software with high-level language commands, or on a line-assembler level.

For system initialization or repetitive sequences of debugger commands, the PROBE user can define a unique set of macro commands that can be saved to disk. In the event a program crashes to a level necessitating system reset, the device allows crash recovery by way of two external keys, regardless of the state of the system.

PC PROBE also contains a serial interface, allowing the use of an external display and keyboard without disturbing the user's primary display.

(List Price: $1,895)
Requires: PC-DOS 2.0.
Atron Corp.
20665 Fourth St.
Saratoga, CA 95070
(408) 741-5900

CIRCLE 787 ON READER SERVICE CARD

Info-Mate 212A

A Bell 212A-type modem with the capability of storing 52 32-digit telephone numbers within its memory. The modem automatically adapts to the user's communications parameters, and incorporates features such as auto-dial, auto-answer, auto-speed select of 300 or 1200 baud, and auto-parity select.

All commands are entered from the user's system over the RS-232 interface, using ASCII characters. Commands are single level, eliminating the need to sequence the device through several command states or menus to perform such functions as automatic dialing or disconnect.

The unit's auto-dialing function can be commanded to blind dial using pulse or tone dialing or a combination of the two. It also electronically detects call progress tones as dial, busy, ring-back, modem answer tone, and the human voice. The built-in memory stores up to 52 32-digit phone numbers or messages for database access. It also provides advanced dialing commands—dial immediate, dial last number, dial until answered, dial alternative number, and dial from memory.

(List Price: $595)
Cermetek Electronics
1308 Borregas Ave.
Sunnyvale, CA 94089
(408) 734-8150

CIRCLE 722 ON READER SERVICE CARD

PC PROBE, Atron Corp.

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CIRCLE 526 ON READER SERVICE CARD

CONO-COLOR Adapter

A graphics board equipped with 128K of memory. The board is compatible with the IBM Color/Graphics adapter in both text and graphics mode, and can run all software developed for the IBM board without modification. In addition to the text and graphics mode, the CONO-COLOR Adapter includes alternate hi res modes, capable of resolutions of 640 × 400 and 512×512 pixels.

At any resolution, the user may select a palette of 16 colors for simultaneous display from a spectrum of 256 possible colors. A color map lets the user modify the palette for instantaneous color changes and special effects, including motion.

The CONO-COLOR Adapter also features a light pen interface with resolution of one pixel, multiple video display pages, wraparound panning, hardware scrolling, dual character fonts, high speed erase, and outputs to digital and analog RGB and composite video monitors. BASIC graphics functions are supported.

The board is packaged with the *Conographic Input/Output System (CIOS)* software, containing all of the drivers for the adapter, and a set of assembly language graphics primitives. *CIOS* also includes a complement of multi-color paint routines, with FILL TO, FILL ONLY, and windowing options.

(List Price: $895)
Conographic Corp.
2268 Golden Cir.
Newport Beach, CA 92660
(714) 474-1180

CIRCLE 789 ON READER SERVICE CARD

PM-300 Modem with COMPAC Software

An internally mounted 300-baud modem compatible with Bell-103. The unit has auto answer function with a selectable number of rings before pick-up, and dial-out function with Touch-Tone or pulse dialing. The unit does not require an additional RS-232 card or additional connectors.

The modem is provided with *COMPAC* software, a videotext program to support asynchronous communications. It has auto logon, file download and upload capabilities under error correcting protocol. Data received may be entered into a disk file or buffer, and contents may be displayed, printed or transmitted.

(List Price: $249; COMPAC alone $69.95)
Requires: COMPAC Program: 64K, one disk drive, PC-DOS.
Avcom, Inc.
P.O. Box 29153
Columbus, OH 43229
(614) 882-8176

CIRCLE 770 ON READER SERVICE CARD

SAM+ Centronics, Black Box Catalog

BLACK BOX SAM + Centronics

A break-out box, providing direct access to all active signal and ground leads of the Centronics parallel interface. The unit allows users to reconfigure, patch, monitor, and test all active interface leads.

Permanently monitored leads include: Data Strobe, Bits 1 through 8, Acknowledge, Busy, Paper Empty, Select, OSCXT, Input Prime, and Fault. Leads that are not permanently monitored may be tested for ground presence and pulse by patching into four square L.E.D.s. Negative and positive pulse detection circuits are included for locating and identifying intermittent pulses. The unit is also equipped with two inverters that allows the user to invert strobe or acknowledge lines.

(List Price: $225)
Black Box Catalog
Mayview Rd. at Park Dr.
P.O. Box 12800
Pittsburgh, PA 15241
(412) 746-2910
TWX: 510-697-3125

CIRCLE 771 ON READER SERVICE CARD

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Epson FX-100 or FX-80 Printer	Call for price
Epson MX-100 Printer	Call for price
Hayes 1200 Smartmodem	$ 505.00
Hayes 300 Smartmodem	$ 199.00
Hayes 1200B Internal Modem	$ 475.00
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AST Boards	Call for price
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Microsoft Multiplan	$ 190.00
Sorcim SuperCalc	Call for price
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CIRCLE 468 ON READER SERVICE CARD

SD900 SimPaLink

A Programmable Array Logic (PAL) programmer, allowing users to develop PAL design specifications for AMD, Monolithic Memories, National, and T.I. 20-pin PALs. The SimPaLink includes *PALASM*, software which accepts a Boolean equation and compiles it into an output to drive the programmer.

The device uses an RS-232 25-pin connector and incorporates a 6802 microprocessor. It can operate at terminal rates from 300 to 9600 baud, and at printer rates of 300 and 9600 baud. The unit includes an AC power line adapter.

(List Price: $500)
Structured Design Inc.
1700 Wyatt Dr., #7
Santa Clara, CA 95054
(408) 988-0725

CIRCLE 769 ON READER SERVICE CARD

PC 300 Bar Code Reader

A bar code reader incorporating an integral microprocessor, eliminating the need for external controlling software. The PC 300 connects in series with the keyboard cable, deriving its operating power from the user's system without an external power supply. The device does not affect keyboard operation. Bar code data appears to a user's system as keyboard input.

The PC 300 can read CODABAR and Code 39 labels at scanning rates from three inches to 30 inches per second at standard code densities, using its handheld infrared scanning wand. The wand's scanning aperature is .006-inch.

(List Price: $695)
TPS Electronics
4047 Transport St.
Palo Alto, CA 94303
(415) 856-6833

CIRCLE 768 ON READER SERVICE CARD

PowerPad & Leonardo's Library

A 12 × 12 inch digitizing tablet designed specifically as an input device for children. The PowerPad tablet utilizes multiple point contact technology which responds to direct hand contact with the surface. A series of Mylar overlays, when used with accompanying software, provides the device with a range of applications, including using the tablet as an artist's canvas, a piano keyboard, a game board, and a programming aid.

Leonardo's Library is a series of specially designed software packages for the PowerPad, in six subject areas: music, mathematics, visual arts, science, language arts, and social studies. Available packages include: *Leo's 'Lectric Paint Brush*, an electronic sketch pad for touch drawing in a variety of colors; *MicroMaestro*, for playing and learning music, with notes, scales, and chords reproduced on the user's display; and *PowerPad Programming Kit*, for teaching simplified programming in BASIC or assembly language. The *Library* is written in LOGO, using teaching techniques developed by international educators.

(List Price: PowerPad $99.95; Leonardo's Library programs $24.95 to $49.95)
Chalk Board, Inc.
3772 Pleasantdale Rd.
Atlanta, GA 30340
(404) 496-0101

CIRCLE 786 ON READER SERVICE CARD

SOFTWARE

PC/MOS

An operating system providing multi-user and multitasking capabilities, designed for use with *The Retailer* point-of-sale/inventory control/business accounting program for retail businesses. *PC/MOS (*an acronym for *Personal Computer/Multi-User Operating System)* can support up to 16 workstations when used with an expansion board providing the user with a sufficient number of communications ports. The operating system's file management routines support Indexed Sequential Access Method (ISAM) files, relative and sequential file structures, and can automatically handle record lockout for ISAM and relative record files. *PC-MOS* includes a BASIC compiler and run-time module, a First-In-First-Out print spooler, and a text editor.

(List Price: $300)
Requires: 128K, Hard Disk & one disk drive, asynch serial port(s).
Retail Solutions, Inc.
1211 Alderwood Ave.
Sunnyvale, CA 94086
(408) 734-0653

CIRCLE 785 ON READER SERVICE CARD

Preventive Maintenance

A menu-driven, 16-function program allowing a user to establish and maintain equipment preventive maintenance schedules. The program can be used to set up equipment inventories with descriptive and accounting information. Printed reports include weekly job and future work schedules and inventory lists. The program also allows the creation of historical data files on preventive maintenance performed.

(List Price: $399)
Requires: 64K, one disk drive, PC-DOS, monitor, printer.
Joselli, Inc.
P.O. Box 460
Enka, NC 28728
(704) 252-9146

CIRCLE 724 ON READER SERVICE CARD

APX CORE EXECUTIVE

A multi-tasking/concurrent processing program featuring multiple interactive windows and the capability for integrating any sets of applications software. Other features include automatic data transcription between different applications programs, an ability to save keyboard input and then re-execute it upon command, automatic control of peripheral devices, and an auto-data-lock system. The number of tasks, amount of memory assigned to each task, position and dimension of task windows, and other parameters are definable by the user.

(List Price: approx. $95)

Requires: 128K, two disk drives, PC-DOS, monitor.

Application Executive Corp.
600 Broadway # 4C
New York, NY 10012
(212) 226-6347

CIRCLE 735 ON READER SERVICE CARD

Dollars & Sense

A family financial management program, featuring ease of use and a tutorial diskette. The program establishes and maintains a personalized financial database, useful in maintaining family budgets, keeping records of income and expenses, and in providing information needed to prepare income taxes. *Dollars & $ense* allows a user to prepare graphs and reports which can be displayed or printed in color with appropriate hardware.

The program can be used on an individual level to reconcile checkbooks, manage investments such as real property or stock portfolios, or to analyze personal expenses. Professionally, *Dollar & $ense* allows a user to calculate net worth, manage budgets for a small business, or project business profit or loss. In all, the user can identify up to 12 accounts of five types: assets, liabilities, expenses, income, and checking.

The *Dollars & $ense* package includes a demonstration/tutorial diskette, the program diskette, and a user's manual

(List Price: $165).

Requires: 64K one disk drive, PC-DOS.

Tronix Publishing, Inc.
Monogram Div.
8295 S. La Cienega Blvd.
Inglewood, CA 90301
(213) 215-0529

CIRCLE 716 ON READER SERVICE CARD

Securities Lending System

A program to control securities lending operations for brokers, option houses, arbitrageurs, corporations, and similar organizations and individuals. The *Securities Lending System* is written in COBOL, and provides interactive control over lending and borrowing of all classes of securities, debt and equity.

In addition to the basic program, three optional modules are available, for government lending, extended exposure reporting, and accounting interfacing.

An eight-page management summary of the software is available upon request from the producers of the software.

(List Price: Perpetual Lease Basis: $22,500 without hardware; Monthly Rental Basis: $1,100 without hardware)

Requires: 256K, 10 MB Hard Disk, PC-DOS 2.0, monitor, 200 cps printer, 4800 baud bisynch communications modem.

DML, Inc.
25 Broadway
New York, NY 10004
(212)785-0679

CIRCLE 732 ON READER SERVICE CARD

SalesTaxFile

A file of sales tax rates for over 230 U.S. locations. Every state, and many counties with sales taxes, are included in the file. Records can be added to include locations in which the user requires sales tax rate information. Periodic updates of the file's database are available from the program's manufacturer.

(List Price: $125; manual alone $15)

Requires: 128K, two disk drives, PC-DOS 1.1 or 2.0, printer.

RJL Systems
106 New Haven Ave.
Milford, CT 06460
(203)878-0376

CIRCLE 765 ON READER SERVICE CARD

MailList

A mail-merge program specifically designed for *The FinalWord* word processing program. *MailList* includes utility programs that provide the capability to create and maintain multiple name and address files, and to use this information to automatically generate correctly formatted control files for use by *FinalWord* in preparing form letters or addressing envelopes.

Programs are also included for listing name and address data and preparing mailing labels. *MailList* is written in Microsoft BASIC and is provided in source code form to allow user modification and enhancement.

(List Price: $75)

Requires: 64K, two disk drives, PC-DOS 1.1, *FinalWord*.

Mascot Systems
7022 Bridgeport Cir.
Stockton, CA 95207
(209) 952-4488

CIRCLE 727 ON READER SERVICE CARD

Managing Partner

A law office management program that can handle timekeeping, expense and receipt recording, statement generation, casefile data updating, docket control, and calendaring. *Managing Partner* is menu-driven, and utilizes full screen data entry forms. Input is automatically checked for errors and is cross-referenced to other data files as needed. The program makes use of monitor attributes such as reverse video, half-intensity and blinking characters.

Managing Partner is written using a *dBASE II* relational structure. Files are created with multiple indices, speeding access to data, and each file can contain up to 65,535 records.

(List Price: $2,495)

Requires: 128K, one disk drive, PC-DOS or CP/M-86.

Royce-Edwards Systems
5101 N.W. Gateway Dr.
Kansas City, MO 64151
(800) 821-8637
(816) 587-0716

CIRCLE 719 ON READER SERVICE CARD

Small Fortune Auto-Ledger

A general ledger program designed for small businesses, featuring a Reports Module allowing a user to generate up to 20 custom reports. The program's Double-Account Entry Module is self-balancing, and the Single-Account Entry Module allows transactions to be split as many ways as necessary. Data entry screens feature immediate account verification and current balances.

The program also includes an Audit Module, allowing past activities to be viewed, selected in any or all of 3 ways: past transactions may be displayed which were entered between certain dates; which contain a certain string in their descriptions; or which pertain to a certain account. The module can also print or display all transactions for a given month in the general ledger format.

(List Price: Version 1.1I $200; Version 1.1C $250)

Requires: 64K (Ver. 1.1I) or 96K (Ver. 1.1C), one disk drive, PC-DOS.

Emerald Software, Inc.
2416 Warren Ave. N.
Seattle, WA 98109
(206)282-2100

CIRCLE 729 ON READER SERVICE CARD

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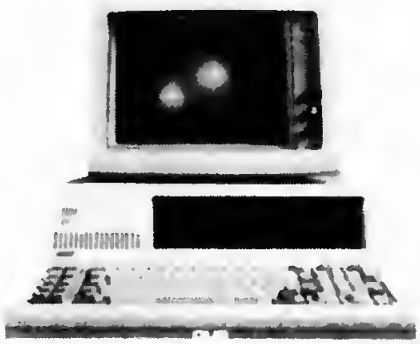

IBM System

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CIRCLE 162 ON READER SERVICE CARD

Menu!

A program that automatically sorts all diskette files and programs into a single system, making it possible to manipulate files without typing a file name. Instead, files or programs are selected by number from a main menu. The program copies, erases, renames, types, restores, compares, and protects files. In addition, it can test diskettes and determine space available on a diskette.

Menu! can also provide the user with password protection to secure sensitive data.

(List Price: $149)

Requires: 64K, two disk drives, PC-DOS or CP/M-86.

Computing!
2519 Greenwich
San Francisco, CA 94123
(415) 567-1634

CIRCLE 752 ON READER SERVICE CARD

Teleminder

A communications program that allows a user to access and retrieve data from the Dow Jones News/Retrieval Service automatically in unattended operation. The program will connect with the commercial database, retrieve selected data, load it onto a diskette, and disconnect from the service. In addition, it can print the news and stock quotes.

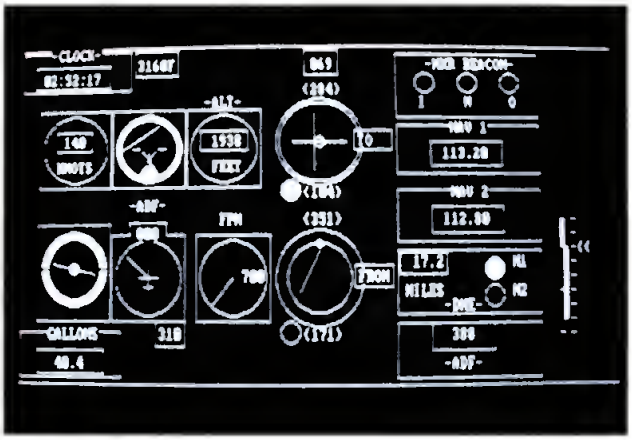
With the optional *Tele-Pak 1* utility, *Teleminder* can also transfer retrieved data directly into such applications programs as the *Dow Jones Market Manager, the Dow Jones Market Analyzer,* and to spreadsheet programs such as *VisiCalc, 1-2-3,* and *Multiplan. Tele-Pak 1* can also transfer *Dow Jones Market Manager* data to *Dow Jones Market Analyzer* files, and vice versa. This allows users with both software packages to access the News/Retrieval service only once to obtain identical data in each program.

(List Price: Teleminder $195; Tele-Pak 1 $30 additional)

Requires: 128K, two disk drives, serial port, Hayes Smartmodem (300 or 1200 bps), printer.

Teleware Inc.
P.O. Box 729
Pine Brook, NJ 07058
(800) 225-0076
(201) 882-0466

CIRCLE 751 ON READER SERVICE CARD



CADET, AVELL, Inc.

SevenWare

A user familiarization and programming aid for use with the Intel 8087 math processing chip. *SevenWare* is composed of three files, titled *Test87, Intro87,* and *MacLib87.*

Test87 verifies the correct installation of the 8087 chip in the user's system. Optional advisory screens provide an overview of the chip's instruction set during testing.

Intro87 is an interactive demonstration of the chip's capabilities. It illustrates the improved precision and range of the 8087's intrinsic floating-point format, and provides comparison processing versus the 8088 chip in side-by-side calculations, using user-supplied input.

MacLib87 is a macro library which extends the IBM Macro Assembler to support the 8087 instruction set. Intel standard mnemonics are employed, which are fully supported by PC-DOS 2.0's "Debug" utility.

(List Price: $79; $279 with an 8087 chip)

SolveWare
P.O. Box 1246
Redondo Beach, CA 90278

CIRCLE 763 ON READER SERVICE CARD

CADET

An instrument flight simulator program. The user configures the program by entering FAA navigation facilities for any location. Data is saved on disk for future use, and up to five such files, each with individually programmable variables such as winds, can be saved for different flights and instrument approaches.

CADET simulates instrument flights, approaches, and landings in real time. Graphics feature an IFR instrument panel, an XY plot of approaches, and a runway display. Panel indicators include 9-channel RNAV, dual VORS, DME, ADF, ILS, Markers, and a stack of keyboard-tuned Nav receivers.

(List Price: Standard: $49; Advanced: $69)

Requires: 64K, one disk drive, PC-DOS.

AVELL, Inc.
693 Rosedale Rd.
Princeton, NJ 08540
(609) 924-8856

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CIRCLE 363 ON READER SERVICE CARD

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DBPlus

A utility program for *dBASE II* files, providing users with the ability to compress/decompress data, sort, and transform files. The sort facility operates faster than using *dBASE II's* index command or sort command when sorting on a single field. *DBPlus* also allows multiple level sorting, up to 32 fields in one pass.

The transform feature of *DBPlus* allows data file structure modifications without extensive reprogramming, and can convert files to a format compatible with *WordStar/MailMerge*.

(List Price: $125)

Requires: 64K, one disk drive, PC-DOS, *dBASE-II*.

HumanSoft
661 Massachusetts Ave.
Arlington, MA 02174
(617) 641-1880

CIRCLE 733 ON READER SERVICE CARD

One-Key Step Scroll

An enhancement subroutine for the BASIC Program Editor that can generate and execute the LIST command with a single keystroke. Successive entries will step the listing forward, backward, or re-LIST the same range of BASIC program lines in one 80 or two 40 column windows. The process is unaffected by running or editing the user's application. In users' systems with both monochrome and color monitors, different groups of lines can be directed to either screen with a single keystroke. All step parameters are variables which can be set for either window from a menu.

Other features from the parameter menu are: a disk file directory with sort and size, a variable listing with last run values, a disk file read and RAM memory peek with bi-directional line or page scroll, and an enhanced RENUM routine. The contents of the disk file can be displayed in hexadecimal for machine language, and in ASCII line format. The latter allows selected BASIC statements from a disk file to be merged into a program.

(List Price: $20)

Requires: 10K, one disk drive, PC-DOS.

IRC Associates
Dept. M
125 Sherrfield Dr., #X9
Saginaw, MI 48603
(517) 792-2156

CIRCLE 750 ON READER SERVICE CARD

Mr. QuarterMaster

A menu-driven inventory program. Features include the ability to generate reports such as inventory listing, reorder listing, usage listing, and an overage/shortage listing; screen display of one or more stock items; price quotations, in one of four possible formats, outputted to the display or printer; recomputation of maximum, minimum, and reorder points every six months (or longer) predicated on past usage and delivery times; receipts and issues updating with proper adjustments made to quantity on hand, quantity on order, usage and due-outs for the updated stock item; plus file maintenance capabilities including add, change, or delete inventory items.

(List Price: $120; manual alone $15)

Requires: 64K (PC-DOS 1.1), 96K (PC-DOS 2.0), one disk drive, PC-DOS 1.1 or 2.0, monitor, printer.

RJL Systems
106 New Haven Ave.
Milford, CT 06460
(203)878-0376

CIRCLE 754 ON READER SERVICE CARD

VersaForm Templates

Three new templates for the *VersaForm Business Form Processor/Database* program. The templates include a diskette providing a screen format, form print formats, a set of preconfigured management reports, and a starter set of business forms where appropriate.

The *Mailing List Template*, in conjunction with *VersaForm*, provides a database design for storing, retrieving, and printing mailing labels. Labels can be selected by a variety of criteria, and can be printed in sorted order. Master lists can be generated and the data stored quickly updated. The template can print labels of various sizes, with up to nine lines per label.

The *Expense Journal* and *Cash Receipts Journal Templates* feature screen formats similar to a journal entry page, and can function as journals of original entry for entering expenses and cash receipts by categories. The templates also feature a set of preconfigured reports which will produce sorted, detailed lists or summaries of expenses or receipts by accounts or subaccounts. The *Expense Journal Template* has a check register report which can be used to reconcile checks with bank statements. The *Cash Receipts Journal Template* can print bank deposit slips for each cash account maintained.

(List Price: $39.95 each)

Requires: 128K, two disk drives, PC-DOS, *VersaForm*.

Applied Software Technology
170 Knowles Dr.
Los Gatos, CA 95030
(408) 370-2662

CIRCLE 722 ON READER SERVICE CARD

AutoCAD

A general purpose computer-aided-drafting program. *AutoCAD* can generate drawings with up to 127 layers and colors, allowing selective viewing or plotting of any layer or combination. The program can calculate and display the distance between any two points in a drawing, and can create drawings of any size to any scale. It can work at any level of scale using bi-directional zooming, and can copy, modify, erase, rotate, and scale drawings vertically and horizontally.

AutoCAD can also generate repetitive patterns automatically, and uses as drafting components both previously created drawings and basic elements such as lines of any width, circles, arcs, and filled-in areas. The program can be used with a light pen, a digitizing tablet, commands from a keyboard, or any combination of these input methods.

Four versions of the program are available, for systems with differing equipment. The versions are for systems with: a single color monitor; both a color and a monochrome monitor; color monitor and Hercules graphics card; and color monitor with a Vertrex VX-384 display driver.

(List Price: All versions $1,000 each; demonstration disk $50)

Requires: *Single Screen:* 192K, two disk drives, PC-DOS, color monitor, color/graphics adapter, asynch communications board, plotter; *Dual Screen:* 128K, two disk drives, PC-DOS, monochrome monitor, color monitor, color/graphics adapter, asynch board, plotter.

Digital Control Systems, Inc.
45 New York Ave.
Framingham, MA 01701
(617) 875-3555

CIRCLE 762 ON READER SERVICE CARD

Estimating-PC

A screen-oriented material estimating program designed for steel fabricators. The program can accommodate up to four separate estimates, of over 3,000 separate line items per estimate simultaneously. Estimates may be saved and restored at any time using diskettes, allowing an unlimited number of estimates, both old and new, to be analyzed.

Labor factors can be entered manually or calculated automatically from internal labor tables, or both. Material is verified against a Master Index of shapes, with weights, areas in square feet, and labor factors automatically extended.

Reports generated by the program include Line Item, Grouped Material, and Cap Sheet.

(List Price: $2,500)

Requires: 128K, two disk drives, PC-DOS, printer.

Digital Engineering, Inc.
325 John Knox Rd.
Tallahassee, FL 32303
(904)386-2601

CIRCLE 736 ON READER SERVICE CARD

DBX

An applications development assistance program for programmers working in Pascal. *DBX* stores keyed data-strings passed to it from a calling application program. These variable length key-strings are stored on disk, using a modified Indexed Sequential Access Method. Keyed entries are divided into pages, which are then indexed. Each page consists of an exact number of disk blocks, in which entries are kept sorted. Using high-speed fixed-length I/O routines, *DBX* can store and retrieve entries while limiting the average number of disk accesses to one per operation.

The program is designed to be included in a user's UCSD p-System library. The user may write a program to call it, or modify the call program included with *DBX* as an example, or modify *DBX* itself. Calling programs pass a simple "callblock" containing input keys, input data, and operations; *DBX* returns output keys, output data, the output page, and a result code for the success or failure of the operation.

The complete *DBX* package consists of the following: *DBX* itself; *MINIBASE*, an example call program; *DBTEST*, a diagnostic routine; and a 50-page manual describing the data structures, procedures, and principal algorithms.

(List Price: $49.95)

Requires: 64K, one disk drive, p-System, Pascal.

Pascal & Associates
135 E. Rosemary St.
Chapel Hill, NC 27514
(919) 942-1411

CIRCLE 749 ON READER SERVICE CARD

VDISK

A menu-driven utility which can read/write and format diskettes for 25 different microcomputers, allowing users to run software designed for differing types of equipment using 5¼-inch diskettes. The software includes a modified version of CP/M-86, and utilities for reading and writing PC-DOS diskettes.

(List Price: $1,150)

Requires: 64K, two disk drives, Modified CP/M-86 (supplied).

CompuView Products, Inc.
1955 Pauline Blvd., #200
Ann Arbor, MI 48103
(313) 996-1299

CIRCLE 764 ON READER SERVICE CARD

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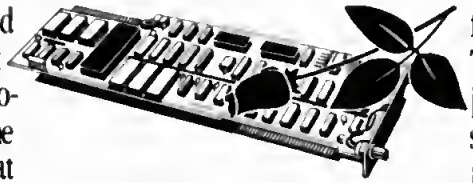
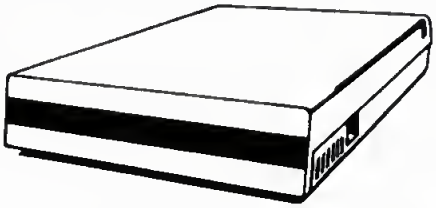
IRMA goes with CHARLIE, the IBM PC or XT.™ IRMA is a Decision Support Interface™—a printed circuit board



that slips into the PC and provides a direct link to the IBM mainframe computer. IRMA provides full 3278 emulation. She puts you on line with the mainframe—via a coax cable—giving you instant access to the big computer, the prime source of current data.

And then, of course, there's sweet IRMALINE.™

IRMA's sister, IRMALINE, links personal computers—no matter how remote—to IBM 3270 networks. And like her sister, IRMALINE is a Decision Support Interface. She lets you conduct 2-way phone communication with your mainframe via a 3270 terminal, from across town or around the world. IRMALINE connects you direct to your mainframe with a local phone call rather than having to dial long distance. So you save money!



Team IRMALINE with IRMALETTE™—another member of MOM's family—to get the same data capture functions IRMA provides.

PC/COM.™ The perfect mate for IRMA.

This software system works in conjunction with IRMA to provide high speed transfer of files between the mainframe and the IBM PC or XT. PC/COM's universal file transfer capability is compatible with major IBM operating systems and associated application files. Single function keys provide users with easy-to-use menus to transfer text files, source programs, data and object files between the mainframe and the personal computer.

Users are subject to centralized mainframe control, so security is much tighter. MOM believes in keeping a tight lip.

AVATAR.™ MOM's UNIVERSAL TERMINAL CONVERTER.

AVATAR is MOM's self-contained microprocessor system that converts a terminal into a full-function, stand-alone personal computer. All it takes is a simple cable connection between

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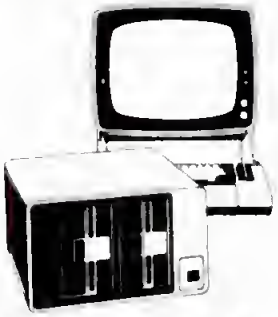
Best.

-from micros to mainframe–MOM™ does it all.

the terminal and the host system. No terminal modification is required. You get PC power on the terminal in addition to your normal terminal capability.

In addition, AVATAR is portable, so it's very easy and efficient to use. Buy AVATAR, and MOM will give you CP/M,® MS-DOS,™ WordStar,™ CalcStar™ and CBASIC™ software. Absolutely free! File transfer software is available as an optional feature.



AVATAR PA1000: Another way to talk to any computer.

The PA1000 protocol converter allows you to connect any asynchronous terminal or PC into an IBM 3270 network and simultaneously into any asynchronous host system. You can do it from either a local or a remote location. The PA1000 has additional ports to which you can attach a printer.

The PC Traveler™ is a full-function IBM-compatible, portable computer. A 28-pound wonder, it comes standard with a gas plasma display for 25 lines/80 characters, 128k RAM memory and an IBM PC-type removable keyboard. The dot matrix impact printer is bi-directional, 132 char-compressed.

The PC Traveler has graphics capability and communication options (300/1200 BPS internal modem). The 8 meg floppy disk is upgradable to 16 megs. The computer uses 16 bit, dual 80186 processors and is 10 times faster than the IBM PC.

Available for delivery, Jan., 1984.

MOM and PATCHES.™

Anything worth preserving is worth protecting, so MOM developed PATCHES. A patented chip protection system insures the integrity of her software. This system allows users to copy MOM's software for their internal use, while a companion chip installed in the PC prevents unauthorized use. PATCHES makes and keeps software and communications private and secure.

Call MOM. 1-800-241-1170.

MOM knows what's best when it comes to micro-to-mainframe access. She's made it her business to know the market. Just ask her about products. Bring your problems to her. Trust her for the best advice. MOM knows how to improve your communications network, and nobody is as cost and quality conscious as she.

Mom is Marketing of Micros to Mainframes, Two Northside 75, Atlanta, Georgia 30318.

MOM even has a computer.

This small, professional computer in a briefcase caught MOM's eye.

MOM™

Specialists in Marketing of Micros to Mainframes.

A division of NPM, Inc.

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CIRCLE 805 ON READER SERVICE CARD

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Sysgen II-10 Fast streaming cassette backup with 10 Mbytes of disk: **$2995.***

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Sysgen Image™ Fast streaming backup for IBM's XT: **$995.** (Right. Nine hundred ninety-five dollars!)

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Our hard disk systems operate under PC-DOS™ or CP/M-86™.

Under PC-DOS, they look like disk drives C: through L:

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SYSGEN
·INCORPORATED·

CIRCLE 474 ON READER SERVICE CARD

*All prices suggested retail. IBM PC and PC DOS are trademarks of International Business Machines. CP/M-86 is a trademark of Digital Research, Inc.

The Link Module

An optional software module for the *MicroPlan* spreadsheet program, designed to be useful in analyzing data from outside sources. Data files obtained from mainframe systems, commercial time-sharing services, or other applications programs, can be analyzed and loaded into a *MicroPlan* worksheet.

The Link Module features posting and cross tabulation commands. With these commands, data can be posted either to individual or multiple rows or columns. In addition to reading files from other applications, *MicroPlan* tables can be read by applications such as database and word processing programs. The module also allows *MicroPlan* to read DIF files.

(List Price: $295)

Requires: 64K, two disk drives, PC-DOS or CP/M-86, *MicroPlan*.

Chang Labs
5300 Stevens Creek Blvd.
San Jose, CA 95129
(408) 246-8020

CIRCLE 718 ON READER SERVICE CARD

DR LOGO

A simplified Logo interpreter that includes established Logo features such as turtle graphics, list processing, workspace management, and full-screen program editing. In addition, help screens and a procedure editor explain Logo primitives and gives examples of how they are used. *DR Logo* offers the user up to 10,000 memory workspace nodes.

A programming feature allows "comments" with programs, explaining individual operations and statements. Comments may be deleted from completed and debugged programs without affecting recorded procedures. The software also permits multi-window displays, allowing commands and editing procedures to appear within a user-defined area on-screen so that text does not interfere with displayed graphics.

DR Logo is written in C, and includes such program debugging aids as procedure tracing and statement monitoring. It supports double-precision floating-point mathematics, including a full set of transcendental functions, logarithms, and their inverses. It can support up to 15 significant digits.

(List Price: $149.95)

Requires: 192K, one disk drive, PC-DOS, monochrome or color monitor with color/graphics adapter.

Digital Research
160 Central Ave.
Pacific Grove, CA 93950
(408) 649-3896

CIRCLE 731 ON READER SERVICE CARD

Lotus 1-2-3 Tutorial

A diskette-based tutorial on the *Lotus 1-2-3* spreadsheet program, simulating the program's operations. The training program contains step-by-step interactive instructions in the use of the Lotus software.

(List Price: $75)

Requires: 64K, one disk drive, PC-DOS.

American Training International, Inc.
3770 Highland Ave., #201
Manhattan Beach, CA 90266
(213) 546-4725

CIRCLE 747 ON READER SERVICE CARD

Dental Office Management Program

A dental financial management program for the PC-XT, providing accounts receivable, billing, and record keeping capabilities. The *MICRO/SYS80 Dental* program is designed for use with a hard disk. It can produce reports such as walk-out statements, reconciliation reports, charge slips, and appointment lists. Third party billing on standard ADA forms or SUPERBILL format is provided, and financial data reports that may be generated include statements, accounts receivable with aging, and production analysis and collection analysis for all producing dentists within an organization.

The program is written in RM COBOL, and is provided in a machine language version. It can interface to word processing programs, and has the capability to maintain a clinical and payment history for two years.

(List Price: $2,400; demo version $30)

Requires: PC-XT; 128K, Hard Disk, PC-DOS 2.0, RM COBOL Run Time Package.

MICRO/SYS80
236 Waverly Rd.
Southhampton, PA 18966
(215) 355-5706

CIRCLE 728 ON READER SERVICE CARD

Mind Tools

A template program for generating pre-set worksheets on spreadsheet programs. Versions of *Mind Tools* are available for *Lotus 1-2-3, Multiplan, VisiCalc,* and *SuperCalc. Mind Tools* offers 18 calculating templates that automatically superimpose formulas and column headings on each worksheet.

(List Price: $69.95-$89.95, depending upon version)

Requires: *Lotus* version: 192K, two disk drives, PC-DOS, *Lotus 1-2-3. VisiCalc, SuperCalc, & Multiplan* versions: 64K, two disk drives, PC-DOS, spreadsheet program.

Expert Systems Inc.
P.O. Box 9
Redmond, WA 98052
(206) 883-8086

CIRCLE 730 ON READER SERVICE CARD

CP+ Version 2.0

A set of programs providing three functions: a computer-aided tutorial on the basic operations of a personal computer; an English language user-interface to a system's operating system and applications programs; and a set of file management utilities. The software's first function provides the user with instruction on the most important computer operations, on a prompted experimental basis. Mistakes in keying commands are pointed out by the tutorial, allowing first-time users to walk-through the operations of their systems quickly.

The second function of *CP+*, its command interface, provides English menus for performing operations such as program selection, file copying, viewing disk directories, erasing, renaming, printing, reviewing, disk formatting, system file copying, and others. This function allows a user to perform operations without the need to enter every file name and coded instruction in precise detail.

The third feature of *CP+ Version 2.0* is a facility called *START+*, which allows a user to integrate applications programs through a customized menu screen. Applications can be loaded, and *CP+* control functions called, from one menu screen.

(List Price: $200)
Requires: 64K, one disk drive, PC-DOS, monitor.
Taurus Software Corp.
3155 Kearney, #100
Fremont, CA 94538
(415) 490-3643

CIRCLE 723 ON READER SERVICE CARD

INTERACTIVE

A simulation language enabling the user to evaluate such areas as manufacturing systems, inventory policies, and scheduling alternatives, through the creation of simulations. The software does not require programming knowledge of the user. A simulation is created by filling in forms provided by *INTERACTIVE's* forms editor. The software checks the logic of simulations created and produces run time interactive simulations through status reports and facilities for altering simulation values.

Included with *INTERACTIVE* are eleven random distribution functions.
(List Price: $2,500)
Requires: 128K, two disk drives, PC-DOS.
Micro Simulation
50 Milk St., #1500
Boston, MA 02109
(617) 451-8448

CIRCLE 760 ON READER SERVICE CARD

SIGN-MASTER

A graphics program allowing users to convert text graphics screens into instant photographic prints or slides with a Polaroid Palette computer image recorder. Using the program with the Polaroid Palette permits users to create 3¼ X 4¼ inch instant color prints, conventional 35mm color slides, or Polaroid Polachrome rapid-access slides from graphics displays.

The program provides an interactive menu which prompts the user to choose from a selection of 72 possible colors, to transform monochrome graphics into prints and transparencies, and/or transfer or reassign colors from a display's output. Users may also change exposure settings, designate interlacing to eliminate raster lines, and prepare multiple slides in a batch exposure.

Following *SIGN-MASTER's* on-line instructions, users are able to control font type, character sizes, colors, underlining of text, italics, and margin justification. Columnar tables of text or numbers can be enclosed in user-selected grid patterns, and up to 100 lines of text can be displayed on a page, depending on font, type, and size.
(List Price: $245)
Requires: 192K, one disk drive, PC-DOS, monochrome monitor (with Hercules graphics card) or color monitor (with color/graphics adapter), Polaroid Palette recorder, pen plotter or dot matrix printer.
Decision Resources, Inc.
25 Sylvan Rd. So.
Westport, CT 06880
(203) 222-1974

CIRCLE 759 ON READER SERVICE CARD

Work & Time Billing

A time and/or materials billing program. Text on bills can be up to 120 characters, and can be retrieved from a file of descriptions or entered manually. Billing rates associated with text records may be overridden, either by a reference code or by an authorized operator. Billing records are stored in client order.

The program allows invoice processing selectable by client, class of client, or for all clients. Other features include credit limit control, sales and commissions, and multiple tax rates calculations.
(List Price: $245)
Requires: 64K, two 320K drives, PC-DOS.
*Data*Easy Software*
877 Bounty Dr., #EE203
Foster City, CA 94404
(415) 571-8100
(415) 349-4001

CIRCLE 748 ON READER SERVICE CARD

AccuTouch Keyboard Training, Keyboard Productivity Inc.

AccuTouch Keyboard Training

Self-education programs for learning either the standard QWERTY or the new DVORAK keyboards. The *AccuTouch* training system is contained on floppy diskettes, and includes a training manual, keyboard charts, and progress recording forms.

The first section of the programs provide instruction in the basic essentials of typing. This is followed by sections giving instruction in correct keying techniques for alpha keys, top row numerics, and right-hand cluster numerics. Exercises measure the learner's speed and accuracy, and remedial exercises can be called in to help the user overcome repetitive errors.

(List Price: $269)

Requires: 64K, one disk drive, PC-DOS, monitor.

Keyboard Productivity Inc.
Marina Towers
4676 Admiralty Way, #419
Marina del Rey, CA 90292
(213) 827-7616

CIRCLE 738 ON READER SERVICE CARD

GRAFOX

A graphics program which can draw information from either IBM standard or Data Interchange Format (DIF) files. The program features menu-driven chart description procedures, and single keystroke commands for producing bar, pie, piebar, and line charts. *GRAFOX* can graph up to four database fields at once, and can plot up to three graphs simultaneously.

The initial release of *GRAFOX* offers full color screen capabilities, and color or printing through compatibility with the Hewlett-Packard 7470A plotter and many printers. The program can screen out data containing errors, and can generate a report of any inaccuracies in the data entered.

(List Price: $295)

Requires: 128K, one disk drive, PC-DOS, color monitor, color/graphics adapter.

Fox & Geller, Inc.
604 Market St.
Elmwood Park, NJ 07407
(201) 794-8883
Telex: 96 8948

CIRCLE 717 ON READER SERVICE CARD

GEOGRAF

A graphics program allowing a user to create graphics using pen plotters. The program consists of fourteen subroutines written in BASIC to create plots and graphs. *GEOGRAF* can be added to a user's applications programs, adding 14 one-word commands to replace the symbol commands required by most plotters.

With the graphics software, the user can establish communications with a plotter, scale a plot, draw and label axes, plot data points with user-selected symbols, connect data with a selection of line types, and draw circles. The routines can handle log scales. The program package includes source code.

(List Price: $250)

Requires: 64K, one disk drive, PC-DOS, serial port, plotter.

Geocomp Corp.
342 Sudbury Rd.
Concord, MA 01742
(617) 369-8304

CIRCLE 734 ON READER SERVICE CARD

/N ("Slash N")

A utility program that removes unused line numbers from BASIC Compiler source code files. This allows larger programs to be compiled, and compiled code is smaller.

(List Price: $30)

Requires: 64K, one disk drive, PC-DOS.

Sherborn Software Systems
226 Western Ave.
Sherborn, MA 01770
(617) 655-6543

CIRCLE 756 ON READER SERVICE CARD

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The program presents all available options to the user on a single menu. *CO-MAIL* can handle both single letter and bulk mailings of any size without requiring intermediate files. It is also compatible with text editor programs and can accept input from existing mailing lists maintained by the user's database or other software.

CO-MAIL is certified by the U.S. Postal Service for E-Com transmission in all three message modes (SAM/COT/TIM).

(List Price: $375)

Requires: 128K, one disk drive, PC-DOS, serial port, modem.

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MORE also produces a *Guide to Trouble-Free Mail Order Buying*. This publication shows buyers how to protect their money and save trouble when ordering by mail. The guide is provided free to purchasers of either *Report*.

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EDITED BY PAUL SOMERSON

User-to-User

PC readers help one another by passing along their questions, comments, and complaints.

How Old's That ROM?

Here's something that belongs in the "Interesting Things I Discovered While Looking for Something Else" file. If you ever need to know the version date of your motherboard ROMs, just use Debug:

```
A> DEBUG        (hit the Enter key)
-D FØØØ:FFFØ FFFF
(hit the Enter key)
```

The date will be displayed in the ASCII listing in the first line on the right side of the screen.

Dennis Landrum
Bryan, Texas

True enough. If you don't want to use Debug, you can get the same results with this small BASIC program:

```
10 DEF SEG=&HFØØØ
20 FOR A=&HFFF5 TO &HFFFC
30 PRINT CHR$(PEEK (A) );
40 NEXT
```

EASY DOS Screen Color

I noticed that the programs CLS.COM in the July *PC*, and SCREEN.COM in the February *PC*, were practically identical when disassembled, even though they were presented very differently (one created in BASIC, the other in Debug). My program COLOR.COM (see Figure 1) reads three characters from the command line to set the foreground, background, and border color attributes. The program looks at the four low-order bits only, so the COLOR 123 is the same as COLOR ABC and COLOR abc. Combinations that seem readable on my monitor include COLOR FAH, COLOR CAH, COLOR KCC, COLOR NDD, and COLOR DFF.

The easiest way to create the file is to use Debug. (Type in everything you see below, except the A) prompt, the "File not found," the "ØØØØ" and ":" near the end, and the dashes at the beginning of each line.)

```
A> DEBUG COLOR.COM
File not found
-E 1ØØ 84 ØF
-E 1Ø2 CD 1Ø
-E 1Ø4 B4 Ø3
-E 1Ø6 cd 1Ø
-E 1Ø8 88 F5
-E 1ØA 87 ØØ
-E 1ØC 8A 1E B4 ØØ
-E 11Ø B4 Ø8
-E 112 CD 1Ø
-E 114 B8 ØØ Ø6
-E 117 81 ØØ
-E 119 BA 5Ø 2Ø
-E 11C 8B 1E 82 ØØ
-E 12Ø DØ E3
```


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CIRCLE 141 ON READER SERVICE CARD


```
-E 122 DØ E3
-E 124 DØ E3
-E 126 DØ E3
-E 128 D1 E3
-E 12A D1 E3
-E 12C D1 E3
-E 12E D1 E3
-E 13Ø CD 1Ø
-E 132 CD 2Ø
-RCX
ØØØØ
:34
-W
-Q
```

The program first does a video call to get the current page in BH. The second call gets the cursor position in DX. It then moves the row to CH, and the third call sets the buffer color from the third letter of the argument. The shifts extract the correct bits for the other colors, then the program clears the screen and recolors it from the current line down.

The above program will work in either DOS 1.1 or 2.0. In 2.0, however, you can configure your system to use ANSI escape sequences to change colors. In this case, the COLOR.COM program above will change only the border color, and the background and cursor colors where you're not typing. To get colored text, you should use

```
138E:0100 B40F          MOV     AH,0F
138E:0102 CD10          INT     10
138E:0104 B403          MOV     AH,03
138E:0106 CD10          INT     10
138E:0108 88F5          MOV     CH,DH
138E:010A B700          MOV     BH,00
138E:010C 8A1E8400      MOV     BL,[0084]
138E:0110 B40B          MOV     AH,0B
138E:0112 CD10          INT     10
138E:0114 B80006        MOV     AX,0600
138E:0117 B100          MOV     CL,00
138E:0119 BA5020        MOV     DX,2050
138E:011C 8B1E8200      MOV     BX,[0082]
138E:0120 D0E3          SHL     BL,1
138E:0122 D0E3          SHL     BL,1
138E:0124 D0E3          SHL     BL,1
138E:0126 D0E3          SHL     BL,1
138E:0128 D1E3          SHL     BX,1
138E:012A D1E3          SHL     BX,1
138E:012C D1E3          SHL     BX,1
138E:012E D1E3          SHL     BX,1
138E:0130 CD10          INT     10
138E:0132 CD20          INT     20
```

Figure 1: *The COLOR.COM program by John M. Sullivan.*

```
138E:0100 BB8000        MOV     BX,0080
138E:0103 021F          ADD     BL,[BX]
138E:0105 C6470124      MOV     BYTE PTR [BX+01],24
138E:0109 C606810018    MOV     BYTE PTR [0081],1B
138E:010E BA8100        MOV     DX,0081
138E:0111 B409          MOV     AH,09
138E:0113 CD21          INT     21
138E:0115 CD20          INT     20
```

Figure 2: *The ESC.COM program by John M. Sullivan.*

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the second program below, ESC.COM (see Figure 2), which allows any escape sequence to be sent to ANSI.SYS.

This program takes the argument(s) given, adds an escape character before it and a $ after, and then calls the DOS write-to-screen system call. So: ESC [36M will set the foreground color to cyan, and ESC [41M the background color to red. You can use ESC.COM in .BAT files to move the cursor, erase lines, and the like—see chapter 13 of the DOS 2.0 manual for a list of the available escape codes.

Note that the order of the RGB Bits for color numbers is reversed for these sequences. I have COLOR 300 and ESC [36M in my AUTOEXEC.BAT file. Also note that when you go into BASIC then exit to DOS, you destroy any effect of COLOR.COM, but not of ESC.COM.

One final caveat—to make ESC.COM work properly, you have to boot DOS 2.0 with a CONFIG.SYS file on your disk that includes the line: DEVICE=ANSI.SYS. The easiest way to do this is to go into DOS and type:

```
COPY CON: CONFING.SYS
(then hit Enter)
DEVICE=ANSI.SYS
(then hit Enter)

(then hit Ctrl+Z)
```

You can also create such files with your word processor. ANSI.SYS must also be on your disk.

To create the ESC.COM file, type in everything you see below except the A> prompt, the "File not found," the "0000" and ":" near the end, and the dashes at the beginning of each line:

```
A>DEBUG ESC.COM
File not found
-E 100 BB 80 00
-E 103 02 1F
-E 105 C6 47 01 24
-E 109 C6 06 81 00 1B
-E 10E BA 81 00
-E 111 B4 09
-E 113 CD 21
-E 115 CD 20
-RCX
0000
:17
-W
-Q
```

John M. Sullivan
Cambridge, Massachusetts

Both of these short programs can come in very handy if you want to change or set colors in DOS. You can do some of the same things by going from DOS into BASIC, setting the colors, then exiting to DOS, but this has several drawbacks: you need to have BASIC on your disk, which wastes space (the two programs above are tiny), and switching from BASIC to DOS often kills any of the colors and gets you back to the boot-up 7,0,0 default.

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Note: In the interest of accuracy, we will gladly accept, even encourage, submissions containing program listings on a disk. *PC* will return or replace a disk at your request. If you send a disk, please include a printout of your submission to ensure against damage in transit.

Furthermore, all programs that create .COM or BSAVE'd executable code from decimal or hex data must be accompanied by the source code in assembly language. This, too, will reduce errors and will be instructive to readers of User-to-User. ■

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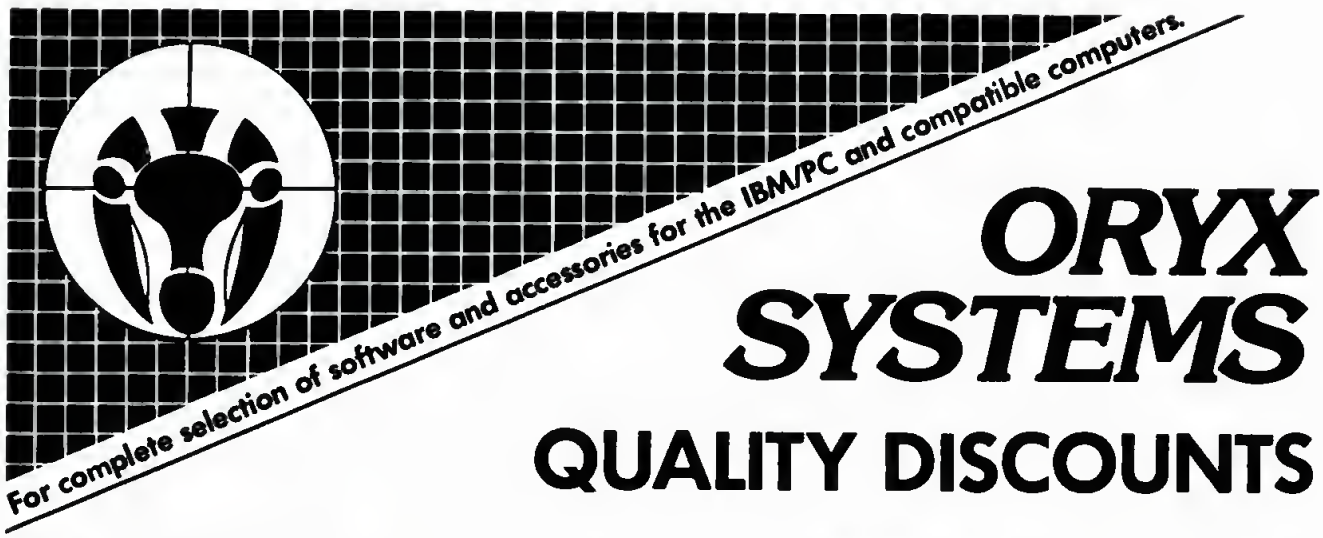

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The Anchorage IBM Personal Computer and Compatible Computer Users Group
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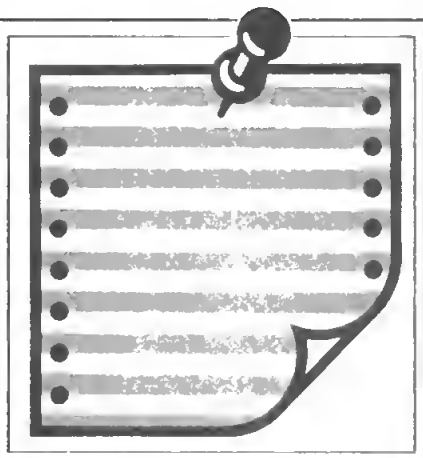

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Chula Vista, CA 92010
(619) 421-9686

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Modesto, CA 95352
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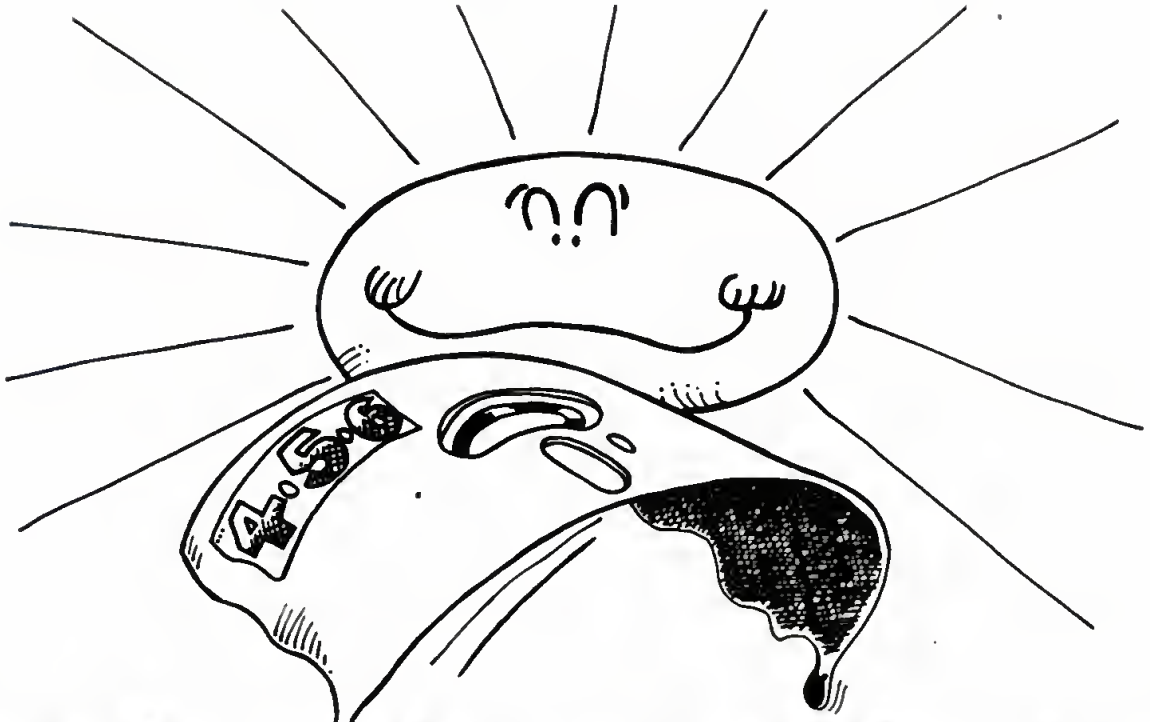

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PC Tutor

Plumping Up The Cursor

Q: Is is possible to increase the cursor scan size from the default values as specified on page 2-60 of the *Technical Reference Manual*? I know this can be done in BASIC by using the LOCATE statement, but when I return to PC-DOS, the cursor size returns to the default values.

I really prefer using the larger block size cursor instead of the 2-scan line cursor. My system has an IBM color/graphics adapter and a monochrome video monitor.

Charles T. Wheeles
Chicago, Illinois

A: *I agree with you. I think that the 2-scan line cursor is hard to find in a full page of text. The simplest solution I know of is to write a short assembly language program. You can do this by working in DEBUG as shown in Figure 1. (If you are using PC-DOS 2.0, you can use the inline assemble feature.)*

What this program does is to call the IBM video BIOS call to let you set up the cursor block start and end. By changing the CH value you change the start line. By changing the CL value (say from 07 to OD for a monochrome display adapter), you change the end scan line.

Once you have loaded the code into memory, perform the command "U100 10B" to unassemble (that is, display) the code. Examine it carefully to make sure you entered everything correctly. Now, save this code. First, change CX to tell how many bytes the program will require; the 16 bytes (10hex) set aside here is conservative. Then use the N command to give the program a name. Finally, enter W to write the program. You may then run the program at any time by calling it by name (in this example, the name is SCAN).

Take a look at page A-43 of the Technical Reference Manual *for more information on the BIOS call number 10hex.*

File 510 Where Are You?

Q: Page 2-14 of the DOS 2.0 manual says, "The number of files on a fixed disk is determined by the amount of space allocated to DOS." What does this mean? I have an IBM XT with 128K and I get a "file creation error" for trying to create the 510th file on the unpartitioned fixed disk.

Manuel A. Espinosa

A: *The sentence should read "The*

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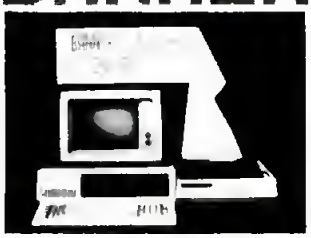

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number of files in the root directory of a fixed disk is determined by the amount of space allocated to DOS." A fixed disk could support up to about 100,000 files—if all the files were empty.

The root directory is limited to 512 files on the XT (509 files plus two hidden files and a volume ID). This is not a firm limitation caused by the size of the disk, but is determined by how many sectors the fixed disk BIOS is willing to allocate for the file directory. By using more sectors, the directory could have more file entries, but at the cost of longer searches for files, slower CHKDSK and DIR operation, and less efficient utilization of the hard disk.

If you need more than 509 files, investigate the subdirectory concept. If you create subdirectories by using the MKDIR command, you can greatly increase the number of possible files.

The number of sectors allocated to the disk directory is specified by an entry in the disk's BIOS Parameter Block (BPB). Take a look at page 14-20 of your DOS 2.0 manual for a short summary of the BPB entries; page 14-28 includes an example on line 86. By changing the "WORD number of root dir entries," you could alter the allowed maximum. This would require a complete reformatting of the drive, however, by a function other than FDISK, so you would lose all of your existing files. Using this procedure with the XT is not recommended unless you are an extremely proficient software writer.

Marginal Results

Q: I have a problem running *WordStar* on my Epson FX-80 printer. When I print a file, I do not get the standard page format. The top margin, instead of being ½ inch is more like 1 inch, while the bottom margin is so small that page numbers appear on the very last line.

Can you suggest a way of dealing with this problem?

Steven Muhlberger

A: *Your problem has to do with setting the top of form for your printer. When*

Enter the underlined portions in response to the prompt symbols on the screen.

```
A>DEBUG
-E100 B4 01 B5 00 B1 07 CD 10 31 C0 CD 21
-RCX
:10
-nSCAN.COM
-W
-Q
A>
```

This DEBUG procedure will create the following results:

ADDRESS	OPCODES	INSTRUCTIONS
0100	B401	MOV AH,01
0102	B500	MOV CH,00
0104	B107	MOV CL,07
0106	CD10	INT 10
0108	31C0	XOR AX,AX
010A	CD21	INT 21

If you have PC-DOS 2.0, its inline assembly feature could be used instead of DEBUG to enter the above instructions.

Figure 1: *Using a DEBUG procedure to create a larger block cursor.*

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PC TUTOR

Slow Printing

Q: I have a problem with *WordStar*. When I use *WordStor* with my PC and a Diablo 1620 printer, I find that printing is slower than if I use the PrtScn key, or the PC-DOS TYPE command, or even the printing commands of STSC's APL*PLUS.

This problem usually is not so bad, but sometimes the print speed slows to about two characters per second! My local dealer did not come up with anything, so do you have any clues?

I use the MODE program to set the COM1 line, (which the printer is connected to, and to inform *WordStar* that the printer is a parallel device.

H. Martin Weingartner
Nashville, Tennessee

A: *This problem is not necessarily a* WordStar *problem. It sounds to me as if you might have an intermittent seriol cable. Most DOS programs that work with o seriol device expect the device to handshake with the computer. This meons that the lines devoted to control (i.e., "Clear to Send") should signal the computer when the printer hos accepted the last charocter.*

*However, the APL*PLUS software is significant in that it does not require handshaking, since many of STSC's customers use three-wire cables, which have no Clear to Send lines. Since you use the MODE program to set up your serial port,* WordStar *is actually using PC-DOS to activate the printer. Thus,* WordStar*—and any other standard DOS program—does use the serial coble's lines for handshaking.*

The fix for your system is simple. Just purchase a new cable and try it out. It may even be that the printer connection is a little bit loose. Try pushing the plug in solidly.

In general, the best cables to use with serial and parallel ports are 25-connector ribbon cobles (the cable is a flat conductor cable with 25 wires in it). These ore available from most deolers.

Discouraging Disconnections

Q: My work requires considerable use of the Dow Jones News/Retrieval Service. Invariably, however, after using the service for 5 or 10 minutes, my PC disconnects from the service with an annoying two-tone beep. A flag comes up on the screen telling me to check connections, phone number, etc. Needless to say, there is no problem with connections and such—the system simply disconnects. What gives?

Dirk Vander Zee

A: *There could be ony of a number of reasons. These are the two most probable.*

First, if you have a call-waiting service on your phones, then the beep that indicotes coll-waiting will disconnect a modem. If you must have call-waiting in your office, make sure that you keep one line free of this encumbrance.

Second, there are many parts of the world where the phone lines ore so poor that interruptions are long enough to convince the computer system that the line is dead, and the modem will disconnect from the line.

If you suspect the problem is caused by the phone line's quality, you might wish to contoct your local telephane company and talk to a service representotive about leasing a data line. Data lines are specially conditioned for the demands made by modem communicotions, which ore completely different from voice line needs. ■

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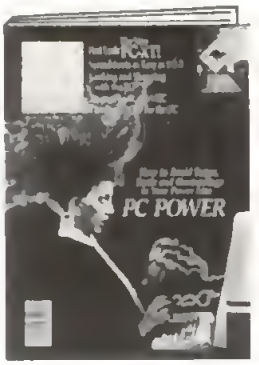

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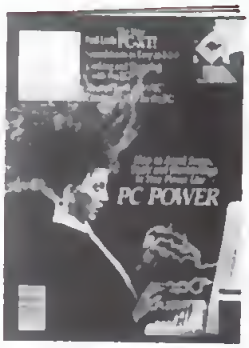

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LANGUAGES/JOHN R. WILSCHKE

Grandfather FORTRAN

Known chiefly as a scientific programming language, FORTRAN has held its own in the computer work place for 26 years.

If you have been reading *PC*, you have probably read about the newer programming languages now available for the PC, such as Ada, APL, C, FORTH, and Pascal. At the same time, one of the major languages in computing, FORTRAN, has been receiving relatively little attention. This is due partly to the poor quality of the original IBM FORTRAN compiler for the PC and partly to misconceptions about this "grandfather" of programming languages in the microcomputer world. Actually, FORTRAN can be a very powerful microcomputer language that should be seriously considered by those wishing to move up from BASIC. I will explore some of the reasons you might choose FORTRAN. But first, FORTRAN's history.

FORTRAN, which derives its name from FORmula TRANslation, is 26 years old. It was developed by IBM in the mid-50s and the first version was released in April 1957. FORTRAN I was followed by FORTRAN II in 1958 and FORTRAN IV in 1962. Although originally developed for the IBM 704 machine, the language was so popular that it was soon adapted to most of the computers of the time. FORTRAN was the first computer language standardized by the American Standards Association, which is now called American National Standards Institute (ANSI). The standard produced FORTRAN 66 (ANS X3.9-1966), which roughly matched IBM's FORTRAN IV. More than 10 years later, a new standard, FORTRAN 77 (ANSI X3, 1978), provided FORTRAN with enhanced features that overcame previous difficulties with text-type data. FORTRAN's input/output (I/O) capabilities were also adapted for use on interactive computer terminals. IBM supports this standard in its version VS FORTRAN for use on the mainframes. Although more code has probably been written in FORTRAN than in any other language, it still suffers from its reputation as only a scientific language. However, its flexibility has allowed it to be used for many general computing applications. It was used to create the Statistical Package for the Social Sciences programs (SPSS), which is used by many university researchers to analyze statistics for insights into social behavior. Its use in computer design packages has been an aid not only to architecture and engineering, but also to industrial and fine arts graphic creation. It has been used for computerized machine control in the manufacturing of

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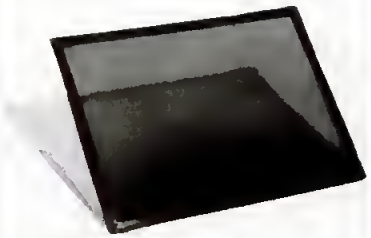

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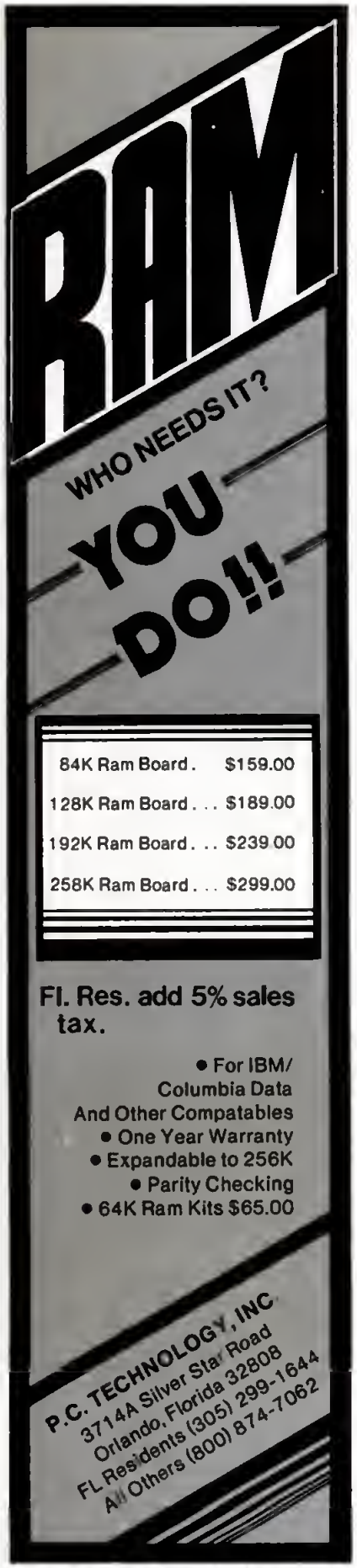


automobiles and aerospace vehicles. The original game, *Adventure*, was written in FORTRAN at the Massachusetts Institute of Technology. And although the business world still relies heavily on COBOL, FORTRAN has been useful in programming the higher mathematics of business strategic planning and risk analysis. All branches of the United States military currently recognize FORTRAN as a suitable language for military programming.

FORTRAN is still growing. In the next few years a version—possibly called FORTRAN 8—will be written to include many of the advanced features that now are in Pascal and Ada without losing commonality with the existing FORTRAN standards. Thus, far from being left in the dust by the newer languages, FORTRAN will remain a major computing language in the decades to come.

Unpopular with Micros

Yet FORTRAN has not been popular in the micro world. I believe this is due to several factors. First, it is a compiled language. Compiled languages, in contrast to interpreted languages, give up debugging convenience for gains in execution speed. It may take 10 minutes or more and a lot of floppy disk handling to compile a program on the PC. However, once compiled, this program will run 10 to 100 times faster, depending on the length and complexity of the original program. The execution of interpreted languages is slow, because an interpreter must translate each line of source code into machine language as the program runs. In compiled languages the translation is done once at the time of compilation and produces a separate "machine language" program that will be used for execution. Also, interpreted languages usually limit the size of the program and the amount of data that can be handled at any one time. Because program development of compiled languages requires considerable time and effort, there was little incentive to use them as long as interpreted programs were small enough that execution speed wasn't a problem. As the micro world progresses into bigger and more complex programs, the use of compiled languages, including FORTRAN, will become more popular.

Another reason why FORTRAN never attained much status in the micro world is because it is defined by reasonably strict standards, and consequently, it was not easy to produce an effective version of FORTRAN for the early 8-bit micros. The mathematical and I/O library routines required large amounts of memory and left very little for the actual FORTRAN program. On the PC, at least 128K is required by all the known compilers to compile a FORTRAN program and fully support the language's capabilities.

All branches of the United States military currently recognize FORTRAN as a suitable language for military programming.

The early users of micros seemed to be either very experienced computer buffs or new computer converts. The experts liked the newer, more powerful and structured languages like Pascal or the efficiency of Assembly language; the converts liked the easy-to-learn BASIC or application packages like *VisiCalc*. There wasn't a place for FORTRAN. As the field of microcomputing moves from the experimentation phase into the mainstream of the computing work force, a new and large group of professional programmers will be using PCs to do the work they once did on the mainframes. It's likely that these programmers will use major languages such as FORTRAN for the same reasons they used such languages on the mainframes.

For a new computer programmer who wants to progress from the interpretive BASIC into the professional languages,

the number of choices is confusing. Languages such as Pascal or Ada have a number of advantages, but FORTRAN has its merits, too.

First, it is easy to learn; FORTRAN provides its basic capabilities with as few instructions as possible (KEYwords or Reserved words). If producing your first program takes a semester's course, FORTRAN is too complicated a language for your current programming level. You can save yourself a lot of headaches by setting your sights a bit lower. However, for a BASIC programmer, little effort is required to learn FORTRAN; of all the programming languages, it comes closest to BASIC both in the form of the code and in the types of variables used.

A major difference between FORTRAN and BASIC is that BASIC has line numbers, while FORTRAN has none. FORTRAN statements are executed according to the order in which they are placed in the lines of code—one statement to a line, beginning in column 7. (This is not entirely true for optimizing compilers, but you can ignore this technicality.) In FORTRAN there are numbers that precede some statements, but they are called LABELS. Their function is to indicate the destination of logical branches like GOTO statements, to define a type of PRINT USING statement called FORMATs, and to locate the end of a loop. Labels appear only where they are needed and do not necessarily appear in numerical order. (This, however, is a very good programming practice which aids program readability.)

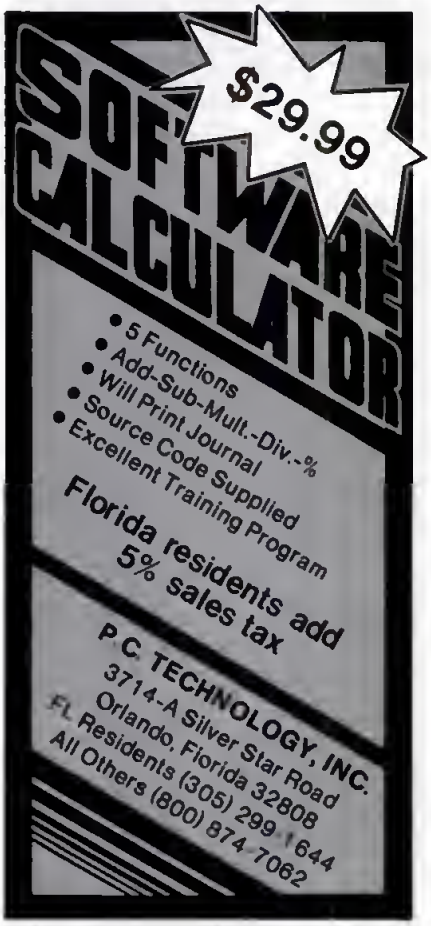
The data types of BASIC are available in FORTRAN. Integers in FORTRAN are assumed to begin with the letters *I,J,K,L,M,N* rather than ending in a percent sign (%) as in BASIC's. In FORTRAN 77, BASIC's string variables are called character variables and are slightly less convenient to use. FORTRAN can also have Logical, or Boolean variables, which can be assigned the values of either true or false. These variables are useful in making complex logical decisions in program control. In addition, some versions also support Complex variables, which are needed for the mathematics of imaginary numbers.

The BASIC programmer should have little trouble understanding a FORTRAN program after only a few minutes of instruction, and learning to write FORTRAN programs wouldn't take much longer.

FORTRAN is easy to use, which will help you keep your programming neat and understandable. Programming should emphasize, rather than disguise, the logical flow of the program. If you cannot find the error and are convinced "it just can't be there," perhaps the complexity of the language is masking what the computer is actually doing. Any language should help the programmer to understand any other program in that language.

This has been one of the major complaints professional programmers have about BASIC and, to a lesser extent, about FORTRAN. FORTRAN's developers gave little thought to a programming language theory. Hence, FORTRAN can be abused. There is a dangerous possibility of assigning different variable names to the same storage location through the use of EQUIVALENCE and COMMON statements. With indiscriminant use of the GOTO branches, one can send a program into logical convolutions so complex that no one can understand the program's purpose. Not only are these programs hard to modify, they are prone to hidden errors of which even the programmer is unaware.

While FORTRAN's design permits poor programming, it also provides the capability to program in an understandable and structured way. The FORTRAN 77 standard restricts the branching into loops and provides the IF THEN ELSE (blocks IFs) structure, allowing for structured programming in much the same way that Pascal and Ada do. In a future issue of *PC*, I'll discuss more of FORTRAN's programming features and then take a look at some of the new FORTRAN compilers now available for the PC. ■



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The Source For Magazines

Two electronic magazines, Real Times and the IBM PC Gazette are now available to Source subscribers through an option called "User Publishing."

The electronic universe can generally be divided into two broad areas: information and communication. But there is a third area that is more or less a hybrid of the two. In addition to the official services and features offered by The Source, CompuServe, Delphi, and other information utilities, a subscription to any of these services also gives you the opportunity to make contact with experts and other individuals scattered across North America—people you would never meet any other way.

This type of opportunity is an aspect of the services that is rarely featured in the ads for the information networks—probably because its value can't easily be condensed into a few lines of advertising copy. But among experienced database users, these services are one of the main advantages of going online. Given the complexity of our computers and all the things we want to do with them, and given the dearth of solid information, the easy availability of online expertise can be a godsend.

A Bonus for PCers

IBM PC owners are particularly fortunate, for in addition to a number of reservoirs of non-machine-specific microcomputer information, there are quite a few individuals dedicated to providing tips and advice about the PC, the XT, and the PC*jr*. One such reservoir is the User Publishing area of The Source. Among its offerings are two IBM-specific electronic magazines.

User Publishing contains features, services, and creative efforts offered by individuals. The Source provides the mechanism, but the individuals, and in some cases companies, provide the content. Together there are about 25 features (the most popular is "Dial-A-Date," a sophisticated computerized matchmaking service). The Source charges the information providers for storage, but it also pays a royalty of from 10 to 17.5 percent of the billable connect time its subscribers spend using a particular feature. For Source subscribers there is no additional charge for accessing User Publishing.

You can get into the User Publishing area either by choosing the "Creating and Computing" option from The Source's main menu, followed by "User Publishing" from the succeeding menu, or by typing PUBLIC at The Source command level (→). Once there, you'll find *The IBM PC Gazette* and *Real Times Magazine*. To go directly to the *Gazette*, type PUBLIC 114 DIRECT at the Command Level. For *Real Times*, you type PUBLIC 117 DIRECT.

Both publications offer menus with table-of-contents format and instructions for reading the various articles. Unfortunately, the *Gazette* seems to be more than a bit moribund. It has not been updated in over a year, so don't run up your bill reading the out-of-date information. Instead, concentrate on two of the *Gazette* 's seven features. One of these, "POST SCAN IBM," consists of many of the notices that appeared on The Source IBM bulletin board (POST) during 1982. (The Source automatically purges its bulletin boards every 2 weeks.) Because each notice contains The Source account number of the person who posted it, it is possible to contact the individual via Sourcemail in case you want to further investigate a particular topic.

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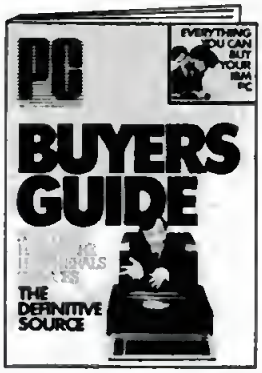

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>D21:+C21*B6*(.01*(100-
B19))
>C21:+C20+B21
>B21:2000
>A21:''    UNITS
(etc.)
```

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A Magazine in Real Time

Real Times, the second IBM-specific magazine, is about as vibrant and up-to-date a publication as you will find anywhere. Currency is a matter of pride on the part of its editor and creator, Tom Kashuba. Within hours of the announcement of the XT, for example, *Real Times* had a complete description and analysis online and ready for its readers, making it the first

Real Times is about as vibrant and up-to-date a publication as you will find anywhere.

publication in North America to carry news of that computer. And because Kashuba is a computer professional who spends his regular working hours laboring in the microworld vineyards, the coverage offered considerably greater depth than the parroted press releases found in much of the conventional media. *Real Times* did the same thing when the PC*jr* was announced last November.

For example, on the subject of PC-PC*jr* software compatibility, Kashuba noted that at the time of the announcement the PC*jr* did not support a monochrome

screen, making it impossible to use PC software designed for that type of monitor. He also noted that the bus expansion slot on the right side of the unit would enable independent firms to supply the second disk drive and other "missing pieces" that separate the PC*jr* from a stripped-down PC. "Once the independents understand the bus protocols, adding more memory or

Future plans include a keyword searchable database of manufacturer's names and addresses.

a second drive shouldn't be difficult at all," Kashuba said. This is the kind of information you won't find in the conventional press and, due to the lead time required to produce a magazine, you might have to wait weeks for it in a computer publication.

In addition to fast-breaking news, you'll find a multipart tutorial on telecommunications, commentary on the industry in general, and the IBM PC Forum, a column designed to help readers with the technical questions they submit. Of special note are articles by Larry Magid, a respected computer writer and consultant whose byline you've probably seen in many print publications. You'll also find BASIC subroutines and other programs you can use. A recent issue included a subroutine to print the date, time, and program title on the top line of the screen, while painting the bottom two lines in inverse video for use in displaying program status and error messages.

Future plans include a keyword searchable database of manufacturer's names and addresses, cross-referenced by product, as well as continuing features on the state of the art. One column currently in

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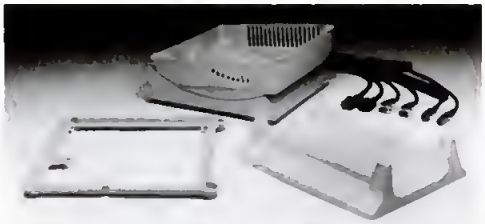

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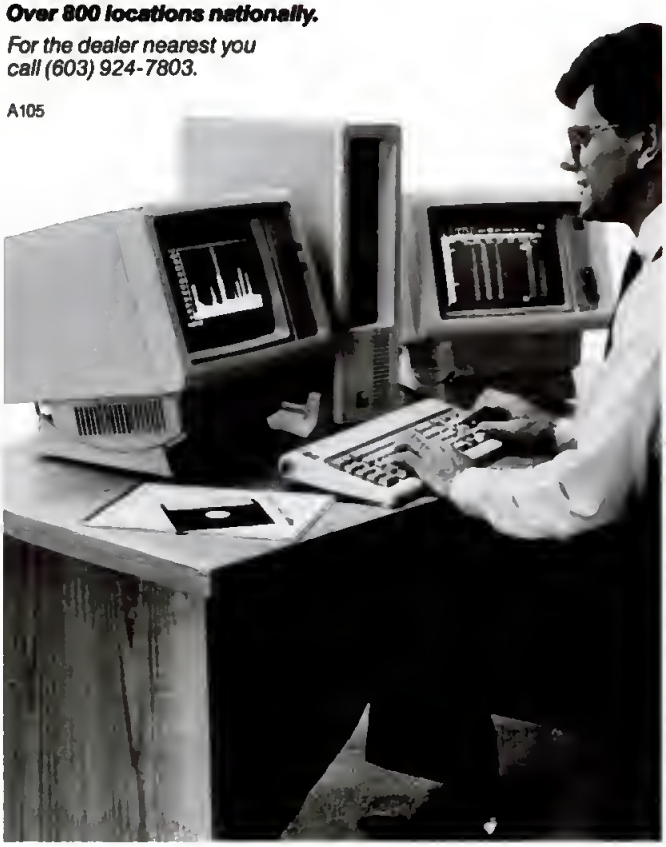

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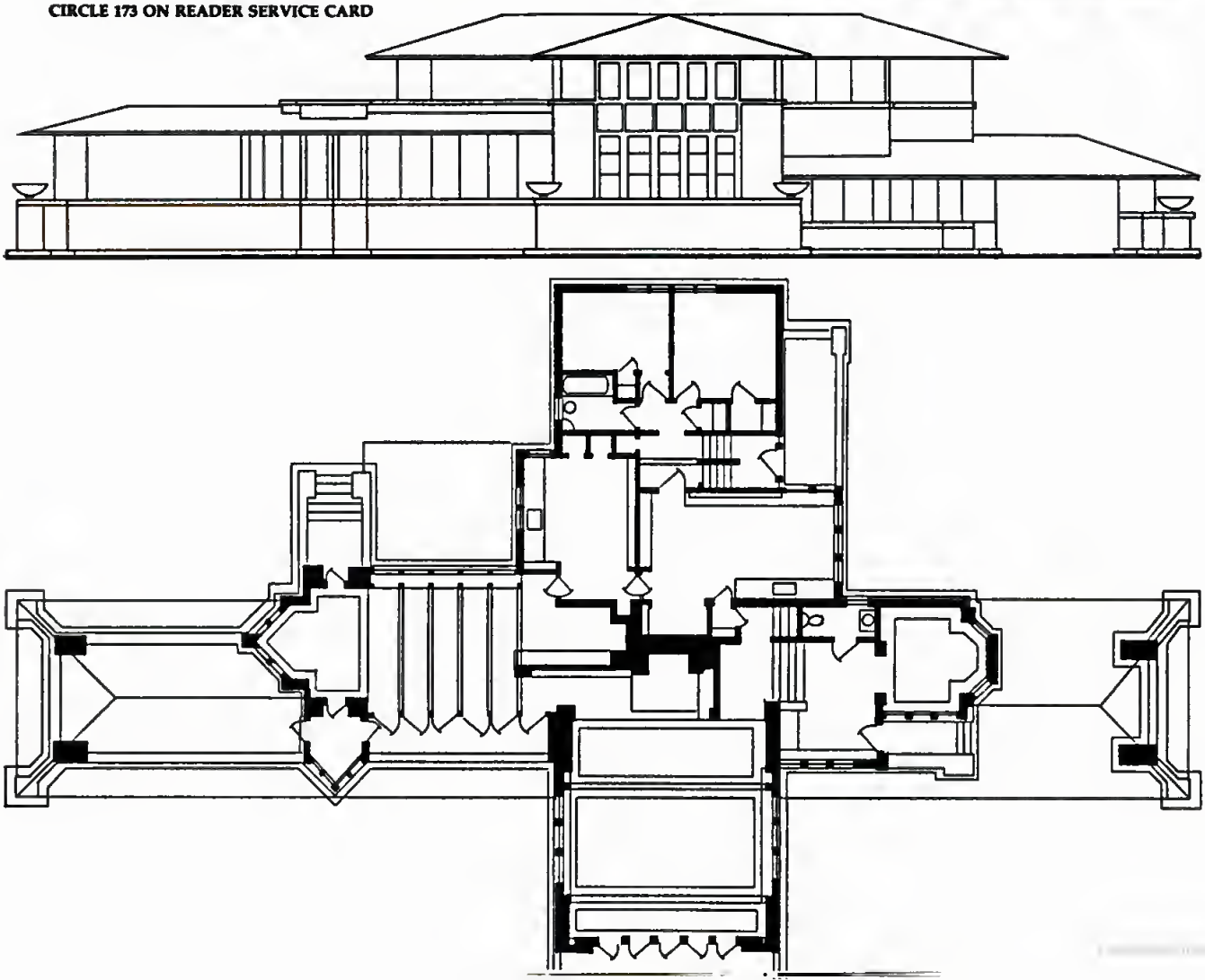

the works, for example, will deal with new PC-compatible drives capable of storing 2.3 megabytes or more on an ordinary floppy disk. Other databases accessible via UNIX or DOS 2.0-like submenus or "directories" are also planned. As Kashuba put it, "Ultimately, *Real Times* will offer a mini-Source within The Source."

Real Times carries an average of seven columns a month and is updated on a weekly basis. The magazine's menu will tell you how long it takes to transmit each article at 1200 baud. If you have a 1200-baud modem, this is definitely the way to read *Real Times* since downloading a given page of text at 1200 baud will cost you an average of nearly 70% less than if you are communicating at 300 baud. Save the file to disk to be read or printed out later, after you have signed off The Source and the meter is no longer running.

Real Times is updated on a weekly basis.

Helpful Hints

The first time you access *Real Times*, it's a good idea to answer "Yes" when you are asked whether you want to read the main help file. Kashuba has written his own "front end" software for his magazine, and in addition to the standard Source commands, it supports a number of other features. Finally, when you've finished reading either the *Gazette* or *Real Times*, respond to the prompt that allows you to leave. This will return you to the User Publishing menu. Type QUIT at the menu's prompt to get out of this area and return to The Source command level. At the point you can type MENU to return to the main menu or enter another command.

In a future issue of *PC*, I'll explore the "Special Interest Group" on the CompuServe system. ■

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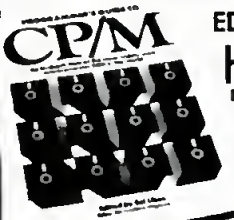

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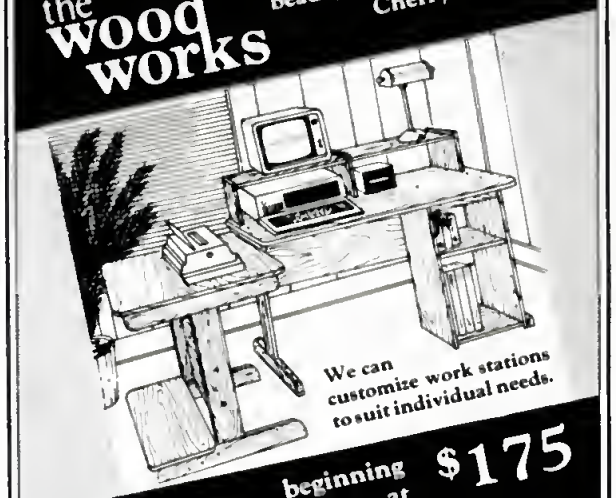

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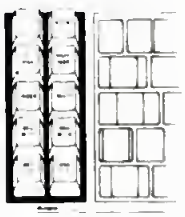

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Stopping The Mask Pirates

Congress is currently considering legislation that will extend existing copyright protection to the templates used in the manufacture of integrated circuits.

Patent law as interpreted by the courts protects the basic circuitry underlying microprocessor chips; copyright law extends protection to the object code contained in ROMs. Neither method of establishing and safeguarding intellectual property rights offers adequate protection for the design works—called "masks"—that are involved in the manufacture of integrated circuit chips.

Numerous court cases have dealt with the ability of copyright laws to protect programming as diverse as computer chess and the Apple operating system (see the report on the Court of Appeals' decision in "*Apple* vs. *Franklin*," *PC*, Volume 2 Number 7). The courts are attempting to extend copyright protection to operating system programs, applications programs, and object and source code. But none of this legal activity helps the original manufacturer of a microprocessor chip. The circuitry or architecture underlying a microprocessor or other integrated circuit component does not fall within even the most liberal interpretation of copyright protection.

The underlying architecture of a microprocessor is covered by patents, however. But timing is a problem. By the time a patent is issued, following an extensive examination by the Patent and Trademark Office, the microprocessor may be obsolete. This gap in the laws—the inapplicability of copyright law and the undue delays in patent procedures—has created the potential loophole that puts chip copiers in business. The element most vulnerable to copying is the mask, a template that contains the chip design and defines the pattern of the various layers of deposition materials forming the integrated circuit. Following initial layout, each mask must be tested and revised several times before it is finished. This burden of testing and revising is multiplied by the number of masks the chip in question requires. A chip with six etching and deposition steps during manufacture, for example, requires six different masks. Thus an original, proprietary chip may entail years of development time and millions of development dollars.

Illustration: Lance Miyamoto

In contrast to legitimate manufacturers, whose research and development expenses are substantial, pirates can "knock

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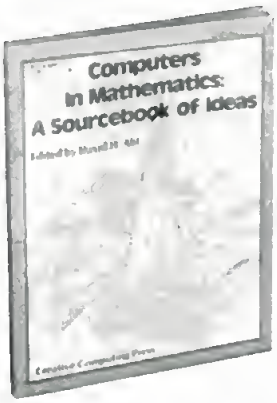

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off" copies of a chip at relatively low cost, using photographic dissection of the device layers. With several months' work, they can flood the market with clones and undersell the original manufacturer.

The original manufacturer's effort and investment of time and money are put in serious jeopardy if the mask is not proprietary in the eyes of the law. And in fact, it is not.

Copyrights do not cover mask works, and the Copyright Office does not accept such works for registration, contending that the masks are more in the nature of a machine than a work of art.

The problem is that copyrights protect "writings of authors" and have been specifically precluded from covering the function or utility of a device, which is within the domain of patents. For example, an originally contoured circuit housing might be copyrightable if the shape is considered ornamental as well as functional. But if the shape of the housing is intended to improve heat transfer, a patent, not a copyright, is the proper form of protection.

Copiers of integrated circuit chips have argued that they are immune from prosecution since copyrights do not apply to chip designs, and, in many cases, the underlying circuitry is not patented. It has also been argued that any programming embodied by a chip is not protected by copyright low (this, incidentally, is no longer the case).

Many manufacturers of second-source devices are, of course, licensed by the primary device manufacturer. Recently, however, anumber of foreign and domestic firms have gone into the second-source business without license, on popular chips such as the 8086 16-bit microprocessor.

Lobbying Efforts

In response to lobbying by prominent organizations associated with the computer chip industry, including Intel and the Semiconductor Industry Association (SIA), a bill was introduced in Congress in 1978 to amend the Copyright Act of 1976

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to specifically extend copyrightable status to masks. Given the large number of chip developers and manufacturers located in Silicon Valley, it is not surprising that the bill was introduced by Congressman Donald Edwards and Norman Mineta of California. During hearings on the bill in the spring of 1979, it became clear that the chip developers and manufacturers were divided in two camps: Intel was a primary force in favor of the bill, whereas the opposition was headed by three firms, Fairchild, Texas Instruments, and National Semiconductor.

The opposition's principal argument was that masks are utilitarian objects that do not fall within the Constitution's provision for protection of "writings of the authors" upon which the copyright laws are based. Testimony drew attention to the potentially devastating impact of the bill on innocent purchasers of equipment containing a chip that turned out to be an unauthorized copy of a copyrighted one. A copyright suit could ruin an innocent purchaser who may have spent a substantial amount of money tooling up to use the equipment. In addition, the opposition had a legitimate concern for the preservation of a second-source market.

Parties in favor of the bill argued that chip developers should not be left powerless against pirates. Protection, it was argued, would encourage more investment in research and development.

As a result of some compromises and, possibly, because some former members of the opposition have been burned by pirates, there now appears to be substantial support for the latest version of the bill (H.R. 1028), recently reviewed by a House subcommittee.

The new version of the bill contains some compromises with respect to innocent purchasers of copyrighted semi-conductor chips. In the event of a good-faith purchase of an unauthorized chip, it offers protection against infringement claims pertaining to any use or distribution before the purchaser had notice of the infringement. The owner of the copyright on a

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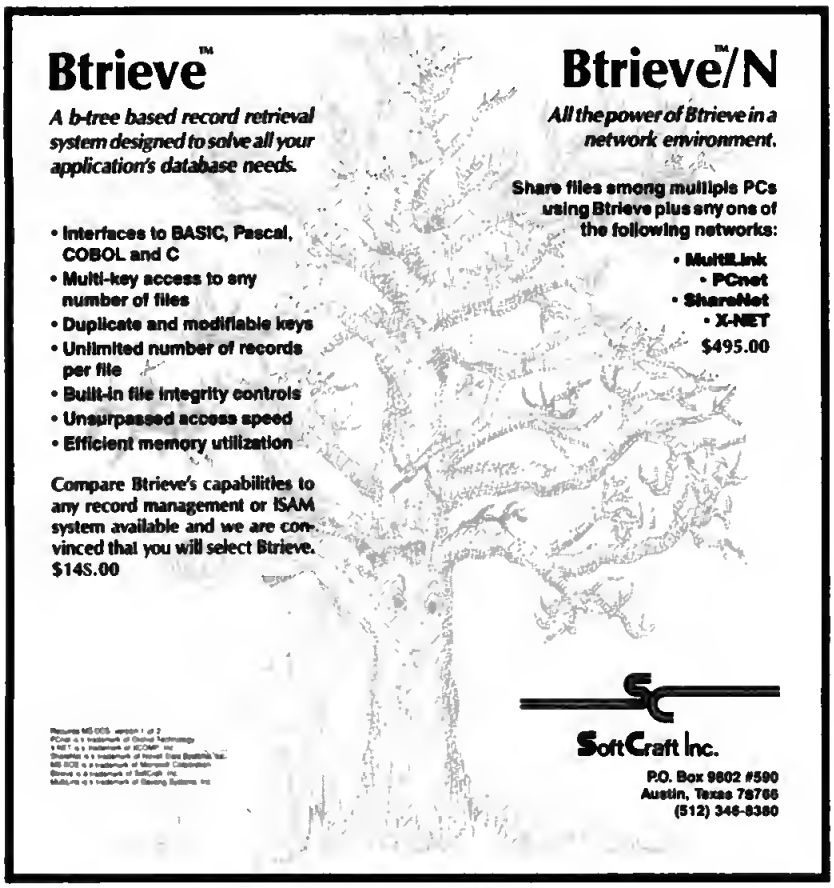

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3. Frequency of issue. Monthly. a. No. of issues published annually: 12. b. Annual Subscription Price: $26.97.

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ISSUES

mask work must grant a nonexclusive copyright license to an innocent purchaser who would suffer a substantial loss if forced to discontinue use of the infringing work. The royalty amount, which the bill specifies as a "reasonable royalty for infringing products," will presumably be determined by the parties. The determination is likely to be based on what, under a given set of conditions, a willing buyer would pay a willing seller, or, if previous licenses have been granted, on what the "going rate" has been.

There are other improvements in the new version of the bill, as well. With what appears to be a realistic appraisal of the useful life of semiconductor products, the bill provides a 10-year copyright term for mask works embodied in either mask or chip form. The conventional terms of copyright protection, of course, are more than five times as long. Also, whereas the earlier version of the bill clumsily attempted to characterize a mask as something like a pictorial, graphic, or sculptural work, the new version contains a more particularized and realistic definition. And finally, the bill specifically provides copyright protection for a chip made from a copyrighted mask as well as for the mask itself.

Opposition to the bill, though small, is principally directed against the "piecemeal" approach of grafting chip protection onto the copyright laws and the potential blurring of basic cpyright principles that covering functional devices may cause.

H.R. 1028, if passed, will help protect the substantial investment for research and development made by innovative firms. At the same time, pirates will be put on notice that Congress is ready to put teeth in the copyright laws to prevent illegal chip copying.

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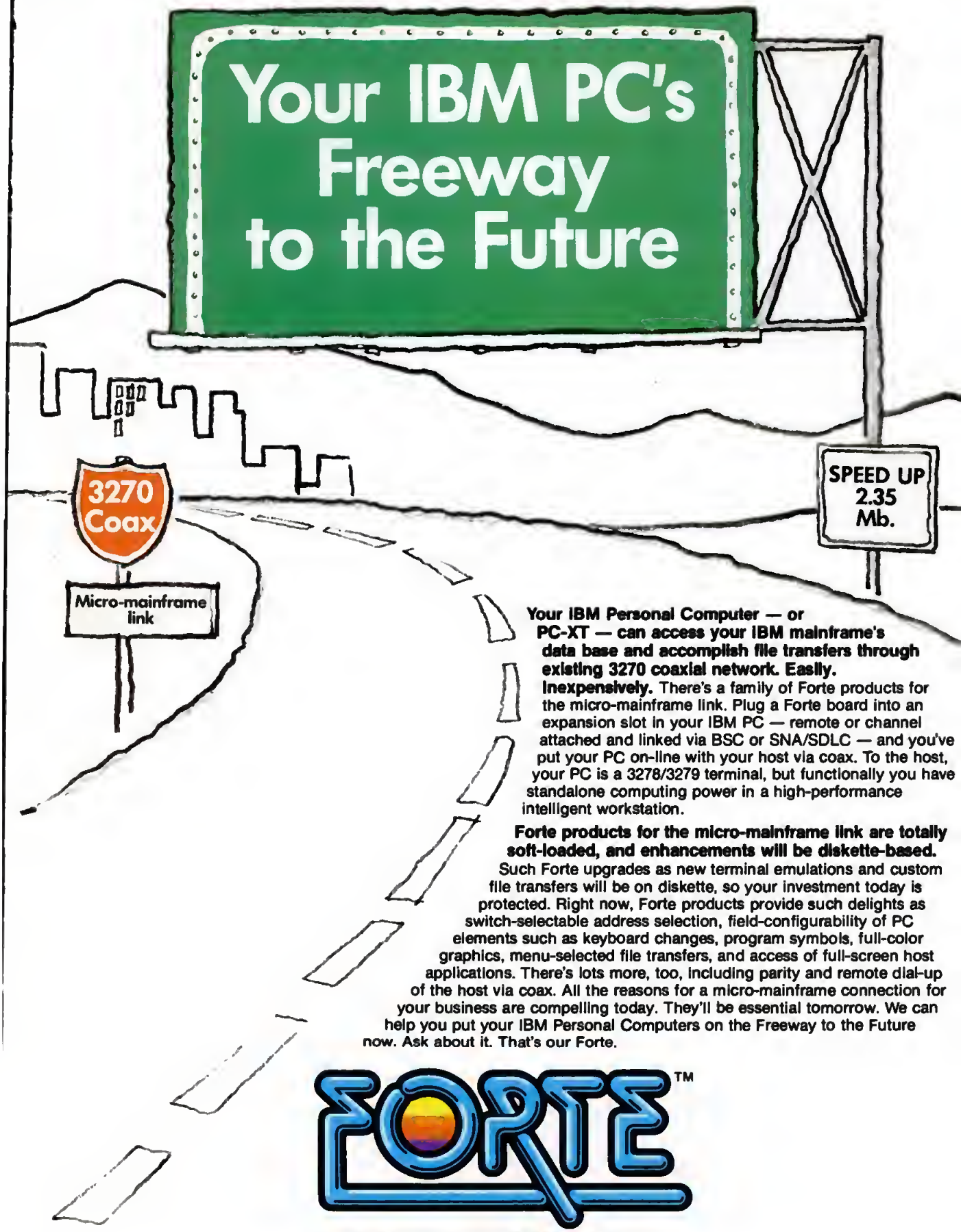

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CIRCLE 291 ON READER SERVICE CARD

Coming Up In PC

dBase II Roundup.

PC takes a close up view of *dBase II*. We'll have an introduction to *dBase*, plus reports on *dBase* applications, expanders, program generators, and learning aids—and a comparison of *dBase II* with BASIC. We'll interview Wayne Ratcliffe about the program he wrote, and ask George Tate of Ashton-Tate about the company he built by promoting the program. In addition, PC editors will tell you why they love *dBase II*.

PC Hotel

If you're calling Ramada, the PC is in. The story of how a nationwide reservations network has been linked to PCs.

Computers and the Public Interest

How lobbying groups like the American Civil Liberties Union (ACLU) and Americans for Democratic Action (ADA)—helped by the Public Interest Computer Association—are using micros to fight city hall.

Statpro

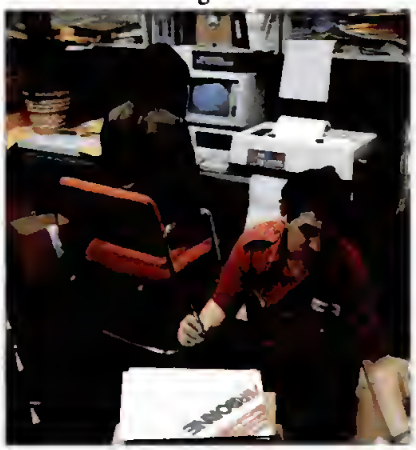
A review of a major new package for statistical specialists who use PCs.

Game Reviews

Just when you thought it was safe to go back to your PC: An intrepid reviewer wends his way through fantasy and horror in *Crush Crumble, Cyborg,* and *Cosmic Nightmare*.

PC at the Olympics

Organizers in Los Angeles are working feverishly to prepare for this summer's Olympics, and PCs are involved. We'll watch our favorite micro go for the administrative gold.



Taking Flight

How is private business beating the U.S. Postal Service at its own game? And how does one of those private concerns seek to gain advantage over its competitors? Roving contributor, Mike Muskal, follows an overnight package on its appointed rounds and along the way discovers how the PC figures prominently in the hopes and dreams—not to mention the deliveries—of Airborne Freight Corporation.

PC Pilot

A report on a new learning language designed to help students navigate the difficult shoals of computer programming.

DOSsier

PC Tech Journal Editor-in-Chief Will Fastie offers his perspective on the frustrations of alternating between operating systems.

Shootout in Silicon Glen

IBM has chosen Scotland as its base of PC operations for Europe, Africa, and the Middle East, so *PC* Magazine sent Special Projects Editor Paul Somerson deep into the glens and high into the highlands to track down the story. In his report, our local hero sidesteps the black-faced sheep, the cattle, and the haggis—and doesn't get kilt.

Lotus Leaf

We excerpt a chapter from a new book on *1-2-3*, the do-it-all financial management package from Lotus.

Attention All Managers

Reviews of *Decisions* and *Decision Analyst*, software to help managers make up their minds . . .

PC Dietician: In Business and Institutions

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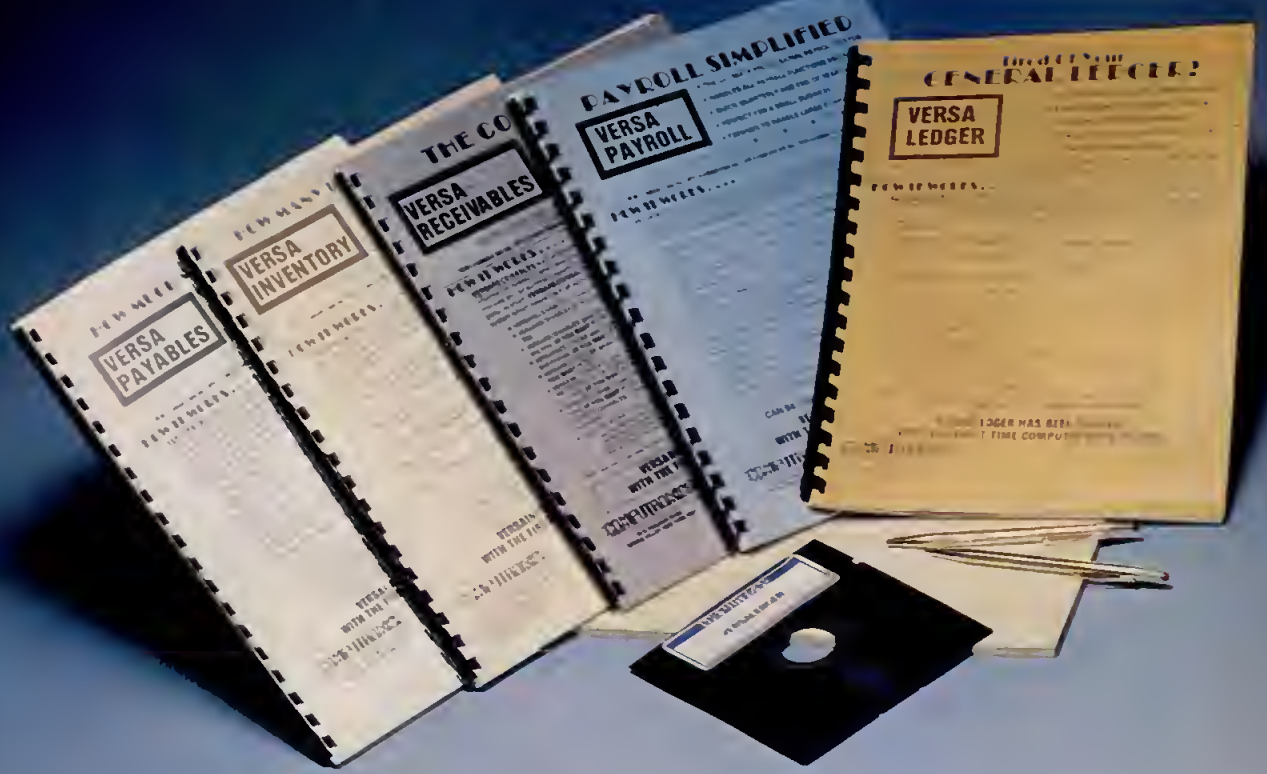

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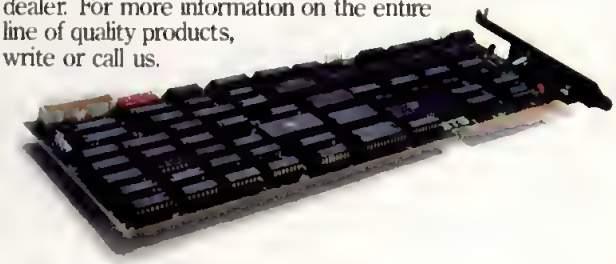

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- Three ELAN Systems; the Secretary, the Manager and the Executive

The Manager

The MANAGER system adds a modem for telephone data communications and by adding a separate handset, will permit voice communications. The modem enables the MANAGER to receive unattended voice and data from any telephone in the U.S. Also, the MANAGER can accept commands through decoding the tones from the telephone keypad.

The Executive

The EXECUTIVE is the most complete implementation of ELAN, adding computer recognition of spoken commands. An executive might phone the PC to leave or retrieve messages or request specific information. The PC, in a spoken voice, can request a user's access code or prompt the user for a command. The executive can respond either by pushing buttons on the telephone, or by actually speaking back to the computer.

ELAN is designed to meet your total communications needs, including computer-to-computer (i.e., networking), person-to-computer, and person-to-person communication requirements for data and voice. The industry-standard high speed Ethernet network protocol is employed in ELAN, permitting many IBM Personal Computers to be linked together by ordinary thin coaxial cable. In addition to his own computer, an ELAN system user can access the other devices attached to the cable — such as printers and large disks.

All versions of ELAN include an Ethernet interface with equipment to convert voice into data and back again. This enables the user to give and receive spoken messages from any location as well as store them for later use. In addition, with the Executive version, all ELAN software packages can be operated through verbal commands, through the telephone keypad or through the IBM PC keyboard. The computer can then respond verbally, either by telephone or 'in person'.

The SECRETARY is the basic ELAN system. It includes an Ethernet interface and all other ELAN features except modem and voice recognition.

Whether you choose the EXECUTIVE, MANAGER or SECRETARY, an ELAN system will improve your productivity and expand the versatility of your IBM PC.

The Secretary

*ELAN (Extended Local Area Network) formerly ComNet

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